THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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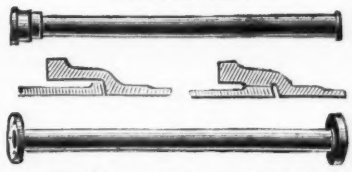

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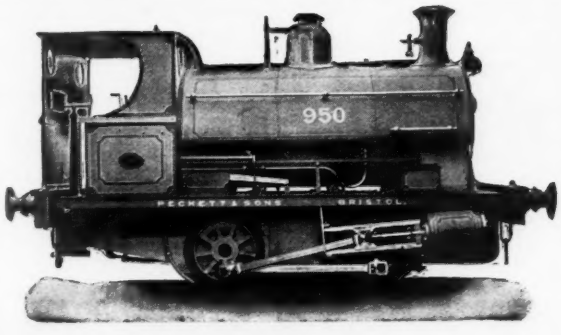

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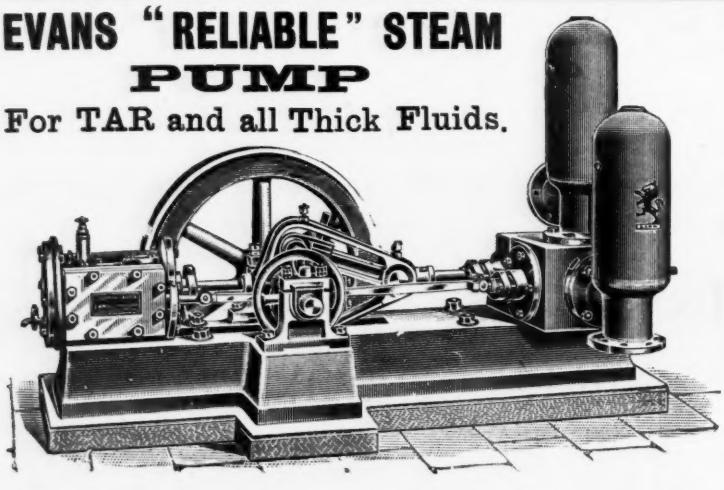

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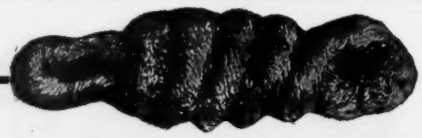

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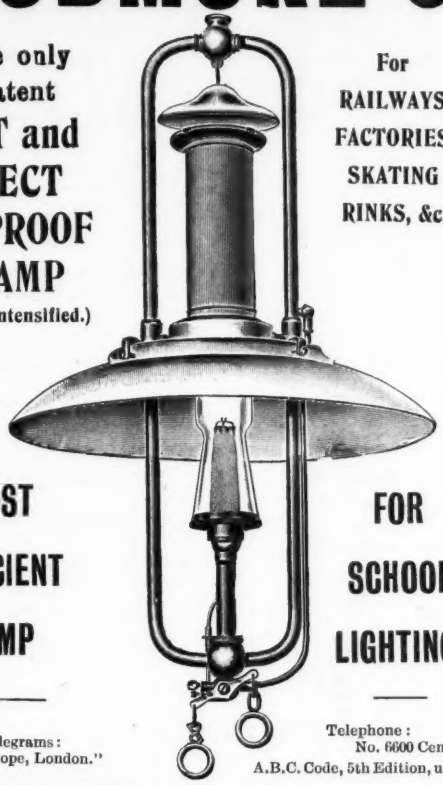

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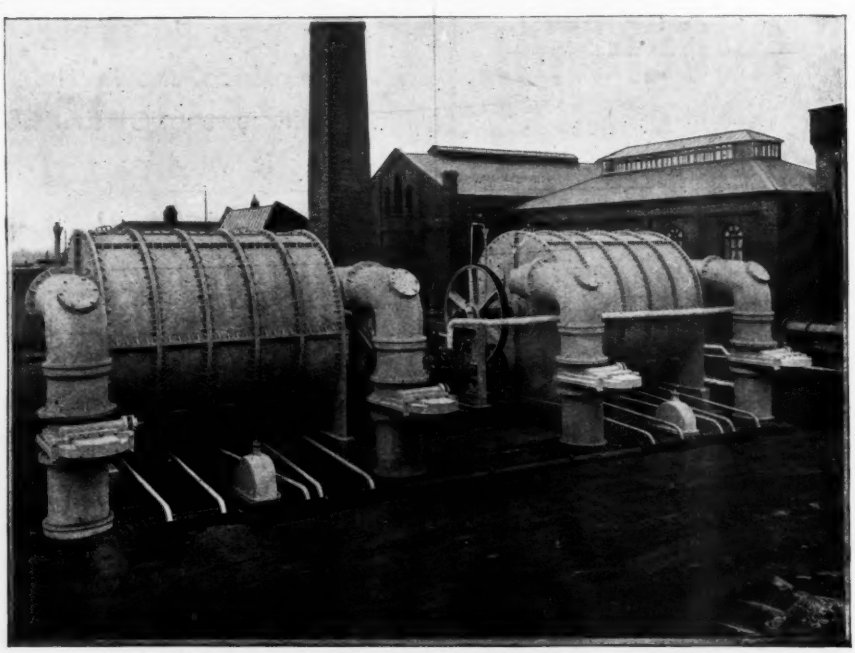

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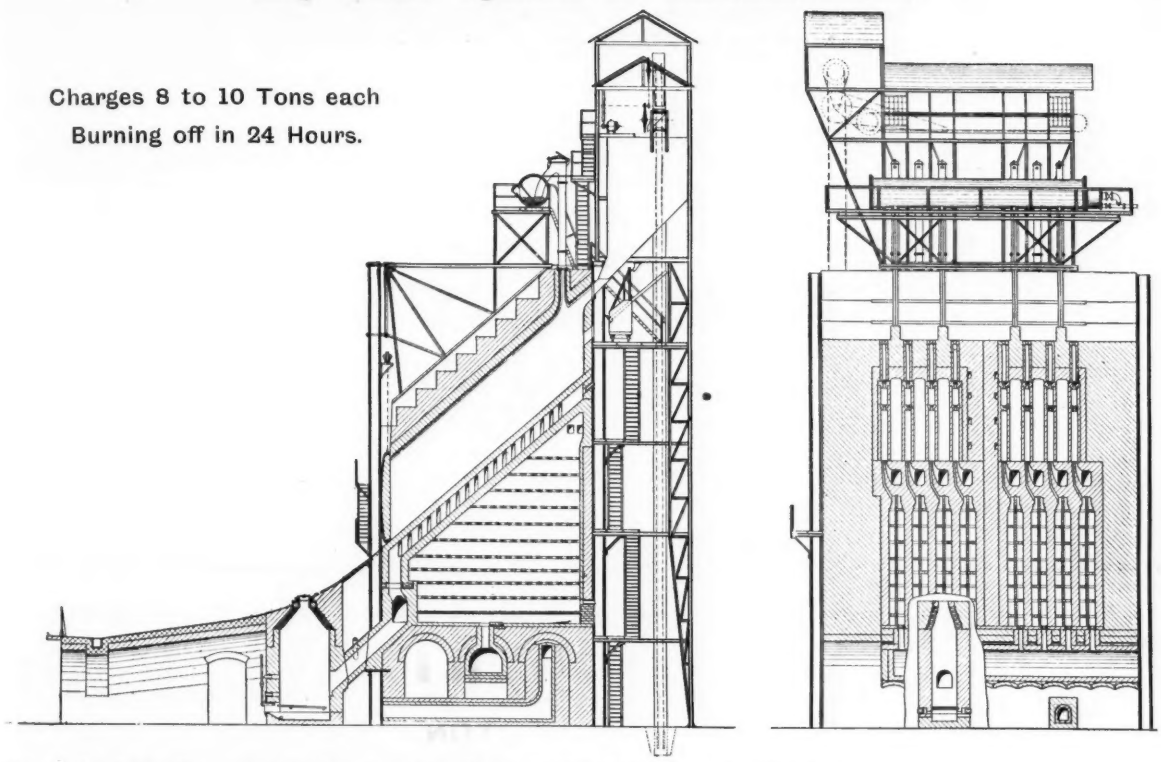

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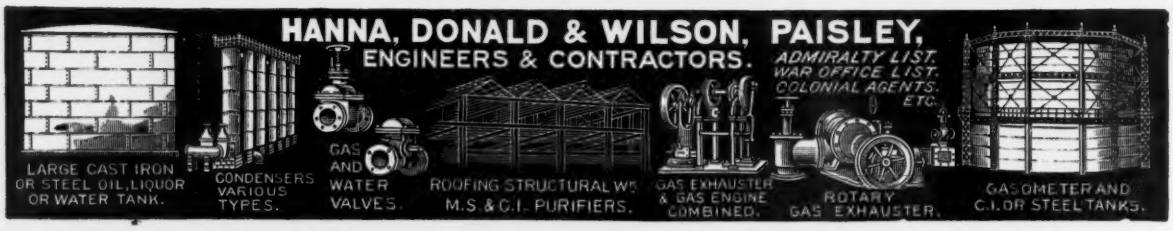
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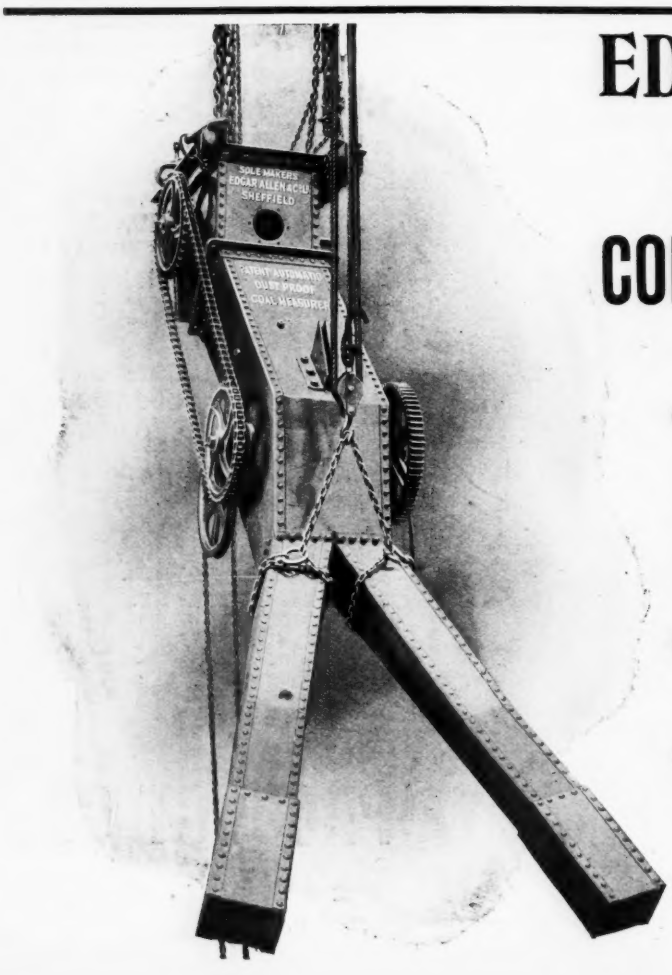

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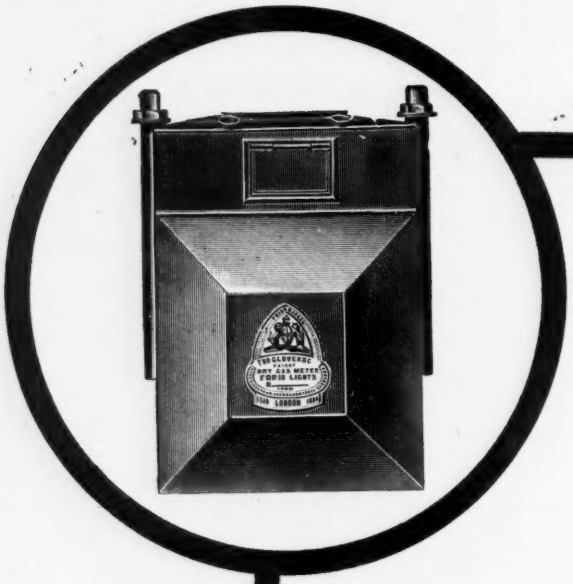

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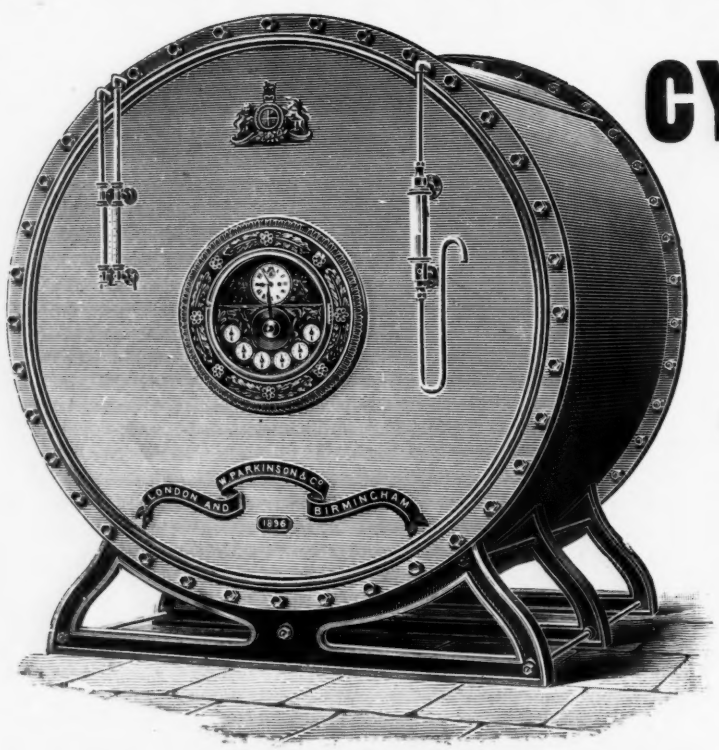

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Burner Victory—And After.

THE victory gained by the Companies who promoted the Standard Burner Bills is so complete, and the overthrow of the opponents so overwhelming, that we feel it our bounden duty to carry the matter a step beyond the point at which it was left in our editorial columns last week. Although the victory is, in the first instance, as complete a one as has ever been gained in the Committee rooms, it is really a victory for the whole gas industry, not only in special relation to the standard burner, but in general relation to other questions of great importance where the issue has to be decided by considerations of commonsense and of justice to a branch of industry which it has too long been the practice, in certain quarters, to malign.

The question that must be to-day uppermost in the minds of those in the technical offices of the gas industry is, What prospective use can be made of the present victory? The resolute commonsense of the House of Commons Committee who adjudicated upon the cases for and against the Joint Burner Bills, as well as their sense of justice, led them to formulate their decision in terms that leave gas companies who have not yet obtained the privilege, or rather the right, of having the illuminating quality of the gas they supply "measured" by a just measure, no alternative but to immediately take the necessary steps to secure it. The right —let this be marked—can now be had for the mere asking. As a matter of fact, we understand that already some companies are moving in this direction; and it is sincerely hoped that the mistake of belated action made in connection with the promotion of the Bills which have been lately occupying so much of our serious attention will not be repeated. The mistake, to be more explicit, was that the resolution to promote a Bill or Bills in the session now fast drawing to a close (the first part of it, at any rate) was arrived at too late to secure the adhesion of anything like the full number of companies who would otherwise have desired to join in the promotion. Obviously the greater the number of companies uniting for this purpose, the less is the expense incurred by the individual companies.

There can now be no room for fear as to the fate of any Bill or Bills which it may be determined to promote. Any and every objection which could possibly be urged, even by the most exacting and narrow-minded local authority has been raised in the course of the recent inquiry. We know with what result. The luminous and unanimous decision of the Commons Committee places the successful result of any future Bill on the subject beyond question, even if there should be opposition, which we can scarcely think any local authority would be likely to offer under the circumstances. Feeling this most sincerely, induces us to say that the Gas Companies' Protection Association (the Chairman of which is Mr. H. E. Jones, whose co-operation throughout the long struggle has been invaluable) owe it to themselves, to the gas industry, and above all to the memory of the late Sir George Livesey—the founder and the first Chairman of the Association—not to let the matter sleep. In the hour of victory, do not let us forget that it was this great leader who first showed the way with the perspicacity and courage that stamped his every action in connection with any movement with which he was identified; and we feel sure that to an appeal to the Association to give its *imprimatur* to the promotion of a Bill in the session of 1911, for the purpose of securing to other companies the opportunity of reaping the harvest of the seed sown in the current session, there will be a very ready response. When it is remembered that perhaps 75 per cent. of the total number of statutory undertakings in the kingdom are at this moment having, and will continue to have (unless they get their Acts changed), their gas tested by burners now formally condemned, it will be seen that there is much yet to be done before the gas industry, as a whole, is put upon a sound and sensible footing in this respect. When that is done, the way will be clear for the still larger change to which the Chairman of the House of Commons Committee referred more than once during the recent proceedings—namely, the abolition of all tests for illuminating quality and the substitution of a calorific standard.

We therefore urge every company, no less in the interests of their consumers as in their own interests, who have not yet secured the right to have their gas tested by the new standard burner, to lose no time in securing it; and we would suggest that the furtherance of any such movement will be hastened by communicating at once with the Secretary of the Gas Companies' Protection Association, Mr. F. E. Cooper (5, Victoria Street, S.W.), and asking for any information that may be desired. From previous experience, we know there will be a willing and immediate response.

Blocking the Burner Bills in the House.

THE chagrin of the opposition to the Standard Burner Bills at their perfect defeat has found vent in a number of notices against the measures on their introduction for third reading. These notices appeared in the "Votes" last week; and were first entered for consideration on Friday, and subsequently for yesterday afternoon. Then they were successively objected to; and so were again postponed—until to-day. These proceedings on the part of the opposition were threatened when smarting in the Committee-rooms under the first blow of the complete victory of the promoters, and consequently their own discomfiture and condemnation. The notices have for their purpose first the destruction of the Bills; or, failing that, their amendment by inserting a clause to ensure that, from Jan. 1 next, the price of gas in the case of each of the promoting companies "shall be such "as will secure that the consumers of the company shall "not be prejudiced by the provisions of this Act"—the price to be charged to be by agreement between the local authorities and companies concerned, or, failing agreement, fixed by an arbitrator agreed upon by the parties, or alternatively appointed by the Board of Trade. Another requirement is the deletion of the Liverpool Gas Company from Bill No. 1. Regarding the unjust proposal as to amendment by making the price to be charged for gas dependent not upon administrative judgment as controlled by the Companies' private statutes, but upon outside influences and judgment, it is on a level with all the attempts of the local authorities at inflicting injustice upon the promoters throughout the earlier course of the measures, and which attempts were rendered altogether nugatory by their obvious intention. Just as well might the Companies claim the right of fixing the amounts of the rates that the local governing bodies (who are also their competitors in business) impose upon the community. But there is no likelihood of anything on third reading but the entire ratification of the decision of the Committee by the House. The Bills were referred to them by a special vote on Second Reading; and the Committee have given their decision. That decision was unanimous, and reasons were adduced for it. Such a decision the Government and the House are bound to respect and uphold.

From the Scenes of their Labours.

ONE by one those who have led the gas industry in the years agone are passing from our midst—honoured and mourned not only by those near to them by the ties of kinship, but by those of the industry for which they laboured. We need look but a little way back in our rolls of the departed to find there inscribed the names of Livesey, Foulis, Valon, and Alfred Colson; and now, sorrowfully, we have to append that of George Careless Trewby. What a fund of memories these names arouse; and what a considerable part their owners, each in his especial place and according to his light and opportunities, played in making history for the industry! It can with truth be said of these contemporaries in the gas profession that, though they are dead, their work

liveth. They all helped, in greater or less degree, to make the gas industry what it is to-day; and their examples are an inspiration to the carrying on of the work they have laid down with that same broad-minded progressivism that they themselves displayed, in which the animating source was the desire that their work should be of real lasting benefit in the development of the industry into which they had thrown their lot.

There are few living to-day in the gas profession who entered it 57 years ago, as did Mr. Trewby, when he became pupil to Mr. F. J. Evans, the accomplished gas engineer who laid the foundations of Beckton; and there was an uninterrupted official identification of Mr. Trewby with the gas industry from the time when he completed his articles to the day of his retirement from the position of chief technical official of the Gaslight and Coke Company. There was, in fact, only the short severance of service in that Company during the few years, early in his professional career, that our now deceased friend spent in Constantinople and at Brentford. But from 1865 to 1904, the record of service for the Company was unbroken. Not astonishing was it that the large Company in 1900, when first there was definite talk about the retirement of Mr. Trewby, should have found difficulty in replacing experience and knowledge so unique as that possessed by their Technical Chief. Capacity of the right order in the gas industry there undoubtedly was; but the most gifted capacity could not be dumped into the responsible position without experience of the particular conditions. And so the length of liberty from responsibility was shortened by the four years from 1900 to 1904, during which Mr. Goulden was making complete his qualifications as prospective successor by garnering experience at the head office in association with his chief.

Among his professional colleagues, there was always an amount of sympathy with Mr. Trewby in his position under the old *régime* of the Company. The whole system of administration was such, for the major part of the time he was the Technical Chief of the manufacturing department, that he was shorn of as much responsibility and power as possible. Under the circumstances, the Company were bound to, as it did, suffer. And it fell into concrete practices into which it was difficult to introduce and insist upon the economies from which other gas companies were reaping reward. The noxious weeds of custom, cherished by an autocratic, inexorable, and technically untrained management, choked all the efforts of the chief to produce reformation. All this has changed under the new *régime*. But this we must say for Mr. Trewby, that where he was denied greater success by a system that confined his actions and power, there his successor and the new administration have reaped copiously of economy and profit. The financial solidification by leaps and bounds of the past few years is the greatest condemnation that could possibly have been produced of the system under which Mr. Trewby chafed so many years, and which system, objectionable as it was to him, he had often to defend in the Parliamentary Committee-Rooms out of very loyalty to the Company with whom he had thrown his lot. Had it not been for him, things would have been much worse than they were; and until the present Governor (Mr. Corbet Woodall) appeared on the scene, first as an ordinary Director, Mr. Trewby had to struggle single-handed with those baneful things which he knew only too well existed, and for the survival of which, through his reserve, professional pride, and conscientious loyalty, many censorious ones were (as is all too frequently the case, without full knowledge) prone to blame the technical head.

But he has gone from us, after a few years' rest from the turmoils and the hardships of a long official life largely spent under (we are glad to say) exceptional circumstances. He did much good constructional work in his day, about which something is said elsewhere; and he was a firm friend and ardent supporter of those who were in a position to work more openly and more prominently than he for the common welfare of the industry. He filled (we claim, ably) a position which few could, or would, have filled under like circumstances; and those of his contemporaries who knew him best revered him for it. A happier professional sphere than was a large part of his, needs no forced conception, for such exist freely around us; but that this sphere could have been more honourably or conscientiously occupied, with the repressive influences at every point, cannot be gainsaid by anyone who was intimately acquainted with him—one of the technical builders of the industry—who has so recently passed to his eternal rest.

Some Effects of Change and Experience.

Perfunctoriness is not a characteristic of Heer J. van Rossum du Chattel, the Engineer of the Amsterdam Municipal Gas-Works. He is an Engineer with reasons for all that he does; he is also a critical observer of the current trend of matters in the gas industry. His address as President of the Institution of Dutch Gas Engineers exhibits this particular trait of critical observation. The address induces reflection. It is remarkable how largely in the gas industry new developments and new experiences have undermined, and in part destroyed, long-established doctrines and practices. It is also noteworthy how considerably, in the study of cause and effect, one can in the latter frequently trace the former. The disasters of Hamburg and Geneva are fresh in the memory of Heer du Chattel, as they are in the memories of all gas engineers who are interested in the affairs of, and gather experiences from, the larger world outside their own works' gates and supply areas. Those disasters have their lessons for the gas engineer. The effects of the accidents tell us, in the first place, of the wisdom of not having gas-works overcrowded, of having plenty of room between the various parts of the plant, and of making a well-considered allocation of one part in relation to another for the prevention of the spread of the effects of accidents. Extension work at as cheap a rate as possible is responsible for the bunching together of buildings and plant, and the creation of uneconomical conditions under which to carry on operations, and at the same time of conditions that increase risks. Therefore, having regard to the accidents at Hamburg and Geneva, Heer du Chattel advises that the necessity of room for safety about gas-works should be considered as of importance equal to the provision of extensions themselves. Another thing he counsels is, as the result of his observation of the causes of accident, that no engineer should put perfect trust in the gas-tightness of his valves. Then one looks to Paris, and to the effects of the recent floods (when in large districts, in the hour of their sorest need, the inhabitants were deprived of both gas and electricity); and a nasty shock is administered to the ancient rule as to the placing of gas-works at the lowest, or nearly the lowest, level in the area of supply. But, fortunately, such devastating floods are not of very frequent occurrence; while the maintenance of pressure, and the getting of all possible pressure advantage naturally by the low-level situation of works, have continuous importance, as has also the availability of a waterway (also generally found, where such exist, at about the lowest level of a district) for transport purposes.

There is also a reference in the address to recent strikes at Continental gas-works, and to the successes of the administrations of those works in the struggles. Indubitably, it can be said that these successes are largely due to the changed conditions on gas-works themselves. The larger use of labour-saving machinery in manufacture, the receding dependence on labour per unit of product, are to the good on the side of employers in any concerted contest with unreasonable employees. It has also to be remembered that, while the gas industry is as dependent as ever on labour, and indeed now in the total employ more hands than formerly, the changed circumstances have made an alteration in the classes and the disposition of labour employed. The stokers and yardmen in a gas-works were at one time all-powerful. Where there is mechanical operation, and under the new methods of carbonization and material handling, they are so no longer—either in numbers in relation to the total of the employees, or in the matter of the requisite skill needed for the work. In numbers, they are greatly overweighted in the other departments by men, mostly artizans, of an altogether different stamp—men who are not so easily moved to quarrel with the occupation that produces their daily bread without, at any rate, a certain amount of cause that they feel can be appreciated when examined from their point of view. The retort-house men and yardmen were the ones formerly most susceptible to discontent, unrest, and ruptured relations with their employers. The transfer, however, from one side to the other of the weights of the elements in the composition of employment has had its effect, combined with other considerations—such as improved pay and more congenial environment—in both extending composure and lessening those disturbances in gas-works that were in the past heard of more frequently than now.

In another part of the address, Heer du Chattel places his finger upon various points in the operations of a gas undertaking where improvement and development must be sought

for, so that ground may not be lost. We cannot afford to sit still, without putting forth some effort in self-protection, while, for instance, the residuals markets are being invaded so largely as is the case by the products of recovery coke-ovens. Only recently, we saw how big was the addition from this source to the available supply of sulphate of ammonia last year; and Heer du Chattel alludes to the extra burden placed on an already over-burdened tar market from the same quarter. We cannot, nor should we desire to, stop the progress of the world's economy in any one direction, nor the increased supplies of commodities issuing from that economy. But when it affects market values, the line of action is to see whether fresh compensating outlets cannot be discovered. For tar, Heer du Chattel says "briquettes." Of briquettes we have heard for decades past; but the demand for them has never, so far as we have been able to detect, had any appreciable effect on the absorption of tar. While speaking of the secondary products of gas manufacture, we have it from the President of the Dutch Institution that, in his opinion, coalite is not going to affect gas undertakings. It is palpable that he does not regard the process as an economical one. Quite apart from the direct results of the so-called arrested-temperature carbonization, more than twice the quantity of coal has to be handled in comparison with that required for gas production by the ordinary processes, and the storage required for the inflated material named coalite when there is not a ready sale (as in the summer) is considerable. Neither commercially nor technically, can experienced carbonizers regard the process as economical. Looking to other directions, change calls for the production of greater facility in the matter of cleaning and maintaining in good condition inverted incandescent gas-burners. The efficiency and the economy of the burners are good; and there ought to be a little fortune for someone who is clever enough to invent means for reducing the labour required in connection with them. We do not think that consumers have had sufficient information communicated to them as to the service of the needle regulator in keeping clear the nipples of the burners. Although the address is only compounded of points produced by observation, it is certainly highly suggestive.

The Consultants' Preserves.

THERE appears to be much that is rather ambiguous about the objects of the new Association of Consulting Engineers, to the formation of which reference was made in our columns last week. Though the matter of the creation of such an organization has been under consideration for the past two years, information concerning it is, on the matter being made public, of the most superficial and airy kind; and we have misgivings as to whether any such organization in connection with such a profession as engineering will benefit the members or anyone else—anyway, in the gas industry. The cardinal intention seems to be to form a sort of close preserve within a high ring-fence; while the published objects are the protection of consultants, the protection of the public by keeping out incompetents, and guarding against malpractices and unprofessional conduct. The objects are partly selfish, partly good. But when the year 1910 has arrived, and the world has made vast progress through engineering knowledge, without the assistance of any such body, the necessity for its creation now seems to be no more pressing than it was (say) two or three decades ago, other than that a larger number of men now profess and call themselves consultants, and a larger number of men in official engineering capacity supplement their incomes by developing a consulting practice.

As we understand the exact position, membership of the Association of Consulting Engineers is to be limited to those who are members of the Institution of Civil Engineers, and who are engaged purely as consulting engineers. This draws the rope pretty tightly round those who the founders of the Association are prepared to admit to membership. In the Institution of Gas Engineers, we have many who are members of the Institution of Civil Engineers, whose incomes are partly derived from official service, and partly from consulting work. From membership of the new Association, these are apparently to be interdicted. But we do not think it will make an atom of difference to them; and they will be in a position to smile broadly at the ring-fence over which their position will prevent them climbing. The gas industry would set its face very sternly against any attempt to suppress those men who are not at present engaged solely as consultants, but who from their position in daily practice and from their capacity are very much qualified to act as consultants. In the gas industry, we all know very well the men who from their practice past and present and their experience are fully competent to act as consultants; and no register of membership of the Association of Consulting Engineers will need to be investigated as a certificate or advertisement of their credentials and probity. Therefore so far as the gas industry is concerned, there is no real use for the new Association. In gas, electrical, and water engineering, there is no similarity between the positions of consulting engineers and the members of the medical and legal professions. In the two latter, the organizations that have been formed for their protection and the protection of the public incorporate all who through qualification certified by examination are in practice; and there is no discrimination. In the branches of gas, electrical, and water engineering, those who are in practice purely as consultants form only a section of the whole of these specialized professions; and it may be that, for special purposes, there are men in official service whose experience would be more valuable than that of the engineer whose work is purely and solely consultative. There is no sense whatever in attempting, as has been attempted, to set up a parallel between consulting engineers and medical and legal practitioners.

One of the professed aims of the new body is the protection of the public, if the public will accept the Association's own estimate as to its capacity for protecting them, which we doubt. The public will see in the Association a self-constituted tribunal as to competency—a tribunal strongly dominated by self-interest; and there is doubt as to the public accepting the Association upon its own qualification valuation in this respect. The Association will have no power to prevent local authorities, companies, or private individuals from employing whom they like; and whatever the Association may do cannot stop the infraction of the unwritten law as to touting for professional work, or check the writing of "C.E." after the name of the draughtsman, or the man who has had a few jobs as clerk of works. Membership of the Association can be no more a guarantee against malpractices or violation of professional etiquette than is membership of the Church or other religious body against ethical offences. As a matter of fact, the Association may be, by some with elastic consciences, made the palladium for professional transgression; and it is a very big question whether such an Association would be powerful enough to deal with matters affecting the personal honour of anyone who had been admitted to membership, unless it was of such notoriety that the Council felt themselves on particularly safe ground. It is thought, too, that membership of such an Association will carry weight in Courts of Law and before other tribunals. There will be just as much weight as ever there was given to the views of men who hold official positions of high engineering responsibility. We are also inclined to the view that local authorities, companies, and individuals from among whom clients are drawn will be prone to associate expense with a body designedly formed primarily to protect its members.

Corporation Conditions at Manchester.

A report which has been long looked-for was a few days ago issued by the Special Committee of the Manchester Corporation who have had the matter under consideration, relative to the conditions of service of the officials. It may be recalled that last March, the consideration of proposed advances of salary was deferred pending the report of the Special Committee, who state that in the course of their investigations attention was given to information obtained from municipal and civil service authorities. It was, however, felt that, owing to administrative differences, a common basis hardly existed for comparative purposes. As a result of the deliberations, a series of resolutions are submitted for confirmation by the Council. The effect of these is that no person holding the position of consultant is to be included; that, in formulating proposals as to salaries and wages for adoption by the Council, the Committee contemplate that they will be operative for at least five years, and that there will be no variations therefrom in the future without the express sanction of the Council; that all advances be annually considered by the different Committees; that where the maximum salary or wages fixed for any position is less than that received by the present

occupant of such position, the existing holder shall continue in office at the present salary or wages; and, in the case of the promotion of an official, it shall be competent for the employing Committee, if the official is then in receipt of a higher salary or wages than the minimum for the new appointment, to start such official at a higher remuneration than the minimum that is stated for the position. The Committee then proceed to suggest various alterations of the existing standing orders as to salaries and wages, and the exemption of the police, fire brigade, and persons employed by the Education Committee, and to re-affirm recommendations in an interim report of some months ago, which have already been approved by the Council. These recommendations are that a preliminary open competitive examination be necessary to qualify for an official position in the Corporation service; that a retiring age should be fixed, as well as some form of retiring allowance; and that future appointments of permanent employees under the age of twenty-one should be subject to the applicant passing a satisfactory medical examination. The Committee feel that the consideration of the questions of a retiring age and a retiring allowance should be deferred until the other recommendations contained in the report have received the approval of the Council. Office hours and holidays are dealt with; and a scale of pay is set forth for officials. In many cases the ultimate effect of the adoption of the scale would mean a saving on present salaries; but, of course, as already remarked, it is not proposed in any instance to interfere with the remuneration of existing officers—the revised scale being intended to apply only to new appointments. The report is apparently causing a good deal of dissatisfaction.

Growth of the Rates.

The growing increase in rates, owing to Parliament passing Statutes throwing upon local authorities increased expenditure in connection with education and other services of a semi-national character, without making provision for some equitable contribution from the Imperial Exchequer, has been the subject of a conference at Preston of representatives of educational and other authorities. The chair was taken by Sir Henry Hibbert, who expressed the opinion that it was of great importance to let ratepayers know that a large proportion of the recent increase in the rates was owing to Parliament not paying its fair share for services rendered by the local authorities to the nation, and to their hands being forced by Government departments to incur expenditure which they might otherwise have avoided. They objected strongly to the growing increase in the rates owing to Parliament throwing increased expenditure on to the local authorities, without making provision for some equitable contribution from the Imperial Exchequer. The feeling which he himself had on the matter was that, in face of the present growing charges for education, no new expenditure should be placed upon local authorities, unless the Government itself was prepared to pay about two-thirds towards it. This may be a very good suggestion; but meanwhile the ordinary ratepayer will probably be inclined to say that the total amount of the rates is what he is chiefly concerned with, and if increases are necessary in the directions pointed to, he would like to see reductions made in others. It is quite true, as the Chairman said, that Lancashire is not alone in its protest against the increased expenditure placed upon the shoulders of the ratepayers every year. One speaker thought the mind of the conference might be summed up in the very short sentence: "We want more money and less interference;" while another said they might protest and protest, but they would never do anything unless they fought the Board of Education—it was no use passing pious resolutions. However, a lengthy (and perhaps pious) resolution was adopted ultimately, in the following terms: "That the conference should call the attention of ratepayers throughout the county to the growing increase in the rates, owing to Parliament passing Statutes throwing upon local authorities increased expenditure in connection with education and other services of a semi-national character, without making provision for an equitable contribution from the Imperial Exchequer, and also owing to the arbitrary action of Government Departments in forcing expenditure on the local authorities against their judgment, and without regard to the capacity of the ratepayers to bear the increased burdens; and, further, that the time has arrived for a united and strong stand to be made by local authorities against the tendency of the Board of Education and some other Government departments to endeavour gradually to transfer the direction and control of expenditure out of rates to a bureaucracy in London, and so to undermine the principles on which local administration has been founded." An Executive Committee was also appointed.

The Law of Compensation.

On many occasions attention has been drawn in different quarters to decisions in regard to claims under the Workmen's Compensation Acts; and it will be admitted that even now a good deal of uncertainty remains. This is a matter to which last week "The Times" drew attention in a leading article, that opened by pointing out that the Courts continue to wrestle more or less successfully with the meaning of the Workmen's Compensation Act, and to extract from apparently simple words somewhat surprising results. The typical course of proceedings is, says our contemporary, a finding by the County Court Judge as to a certain mixed question of law and fact; prompt reversal by the Court of Appeal, or, at all events, disagreement among its members; followed by reversal in the House of Lords, or disagreement among the Law Lords. If this is the case--and there has been no lack of evidence to prove that it is—can there be any wonder that litigants, and others who have followed the proceedings at all closely, have felt bewildered? Of course, under the earlier Acts, all sorts of points had to be decided—such as "What is a building?" and other problems of a similar character. Now, however, the question that chiefly arises is as to whether an accident arises out of and in the course of the sufferer's employment; and it is difficult to see how litigation on this head can ever be altogether obviated—as long as the Act remains as at present. That there is a tendency to make these words bear the widest possible meaning is evident. In fact, as "The Times" remarks, it cannot be denied that there is a subtly operating temptation to slide into a vein of uncritical generosity, and to strain, sometimes to breaking point, facts and law to the benefit of the claimant While admitting it would have been unfortunate if the statutory remedy had been cut down to accidents occurring while a worker's tools were in his hands, it is pointed out that perplexity must arise when the remedy is extended to cases in which the workman's duties are apparently over or distinctly interrupted. That the benefits of the Act are being so extended is clear—as the decision in a case which is cited proves. A stoker on board a vessel lying in port went on shore to buy some things of which he was in need. He had some drink; and when returning to the ship by a ladder laid from it to the quay, he fell into the water and was drowned. By a majority, the Law Lords have held that this was an accident arising out of and in the course of his employment. If the provisions of the Act are capable of so wide a construction, it seems hopeless to expect any other than conflicts of judicial opinion. The question of what constitutes an accident has also been similarly generously dealt with; and altogether whatever employers may have to say, workmen have little cause to find fault with the way the Compensation Acts have been administered. At the same time, there should be general agreement with the assertion in the article referred to that no one would maintain it was justifiable that, the Legislature not having thought fit to give under the Act of 1906 an unqualified right of compensation to workmen, Judges should as far as possible repair the defect, and covertly give what they have not openly got.

Results of the Patents Act.

Though in some respects opinions may differ as to the operation of the Patent Law, it is unlikely that there will be any other feeling than satisfaction on the part of inhabitants of the United Kingdom when perusing particulars which have been compiled by Messrs. Leopold Farmer and Sons, and published in the "Financial Times," with respect to the working of the Patents and Designs Act of 1907. The duties which this Act imposed on foreign holders of patents, of opening works in this country, instead of merely importing the finished articles as hitherto, are so well known by this time that it is unnecessary to set them forth; but it is in connection with this provision that the statistics have been prepared. The firm named, who are well-known as surveyors and factory specialists, remark that, through their instrumentality in fixing up foreign patent holders, and their close contact with the working of the Act, they are able to summarize the results of the two-and-a-half years' working. They put the value of land and premises in this country acquired by such

patent holders for the purpose of fulfilling the conditions of the Act, at £198,000; the amount expended, and being expended, in buildings, housing workpeople, &c., at £320,000; and the outlay on plant, machinery and equipment, at £452,000. These figures mean that practically £1,000,000 is invested in this country by foreign holders of patents, in consequence of the passing of the Act. The value of the annual assessment on which rates will be paid is put at £60,000; and the amount contributed per annum as rates, at £20,000. Then it is calculated the works referred to will give employment to about 8200 male and female workpeople, and that the weekly wages bill will amount to over £9000. The number of foreign firms working under these conditions is 40; and in addition there are 25 English firms manufacturing for foreign firms on a royalty basis. The trades are, of course, very varied in character; and the firms concerned are of German, American, Swiss, Dutch, and French nationality. The works are distributed pretty well all over the country; and besides those included in the statistics, it is pointed out that there are several firms at present on the look-out for factories.

The New "Mars" Inverted Burner.

In a communication to the Société Technique du Gaz, M. Cramer, the inventor of the "Mars" burner, described the improvements made since its introduction last September. In indicating to the members the features of the perfected burner, he referred to the causes, technical and commercial, of the slight favour accorded to burners of the inverted type by makers in France. The chief of these were stated to be the adoption of a lateral admission of air and the want of an adjustable injector. Makers were, he said, compelled to construct burners of the lateral air-supply type owing to the existence of patent rights in those having direct air supply; but the latter having recently been declared void, he now makes the "Mars" burner on these lines, and has, moreover, worked out an adjustable injector. The chief points of superiority claimed for the new burner over the one first placed on the market are these: Direct air supply similar to that of an upright burner, and with a small gauzed inlet chamber to break the sudden access of air and prevent lighting-back in the bunsen tube. In consequence of the adoption of this form, the burner can be made of better appearance. The adjustable injector is so contrived that the burner remains fixed and the adjustment made, even while the burner is alight, by the horizontal shifting of a small handle provided with a non-conducting knob. The novel feature of the injector is the application of a stuffing-box between the two parts, which ensures tightness of the injector, and retains its parts in absolute alignment. The burner is likewise fitted with an adjustable air supply, which prevents noise during use, of which complaint was sometimes made in the case of the burner constructed according to the previous model. Lastly, the burner tip is made of magnesia. This allows of the tip being attached by a fairly coarse screw-thread; thus remedying the liability, which was a defect in the original burner, of the tip to become detached owing to the expansion caused by the heat.

At the Hotel Great Central, Marylebone, last Tuesday, Mr. Rees Jeffreys was entertained at a farewell dinner by the Motor Union of Great Britain and Ireland, on his relinquishing the position of Secretary of the Union to take up the secretaryship of the Road Board. Mr. W. Joynson Hicks, who presided, proposed the health of Mr. Jeffreys, and made a presentation to him of an inscribed gold stop-watch and a cheque for £500. He said that in Mr. Jeffreys they had a born organizer. He had organized and brought to great practical success several bodies, including the Motor Union, the Incorporated Institution of Automobile Engineers, the Commercial Motor Users' Association, and the Roads Improvement Association; and he was mainly responsible for the formation of the Motor Union Insurance Company. No one had done more for the improvement of roads.

About a year ago, Dr. Putzeys, Professor of Hygiene at the Liège University, M. Putzeys, the Chief Engineer of the City of Brussels, and M. Rutot announced the discovery in the Campine region of a subterranean sheet of water of considerable extent, which would suffice for the supply of all Lower Belgium. To determine if this announcement was justified, the Government immediately decided to have borings made so as to ascertain as exactly as possible the volume of water in this underground reservoir and of arranging for its utilization. The soundings have now been completed, and the results published. According to some particulars in the Engineering Supplement to "The Times," the area of the reservoir is, in round figures, 160,500 acres, and has been found to be from 80 to 100 feet deep. The hygienic quality of the water has been carefully investigated, and, although slightly ferruginous, it has been shown to be exceedingly pure, owing to the filtering properties of the soil. MM. Putzeys and Rutot prove that this underground lake provides the only source capable of supplying water to the population of the provinces of Antwerp and Flanders.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 281.)

THE Stock Exchange had a quieter time last week, and gave off some signs of the approaching slack season, which seems inclined to begin earlier and earlier every year. Perhaps, too, there was some reaction after the strain of the previous week's settlement, and some relief felt that it was over as well as might be. The depressing factor last week was the monstrous railway strike, unheralded and, as yet, unexplained. This, with its potentialities for mischief, brought prices down. The opening was rather weak. Government issues were most irregular; Consols falling ⅛. Rails drooped on further realization; and Americans closed weaker. Tuesday's business was on a light scale, most things continuing weak. Consols fell another ⅛ for the account. Rails, of course, were pulled down by the strike; and Continental selling lowered the Foreign Market. On Wednesday, everything pointed downwards. Foreigners were no better; and, spite of some dividend announcements, the spread of the strike afflicted rails. Thursday opened heavy, but brightened up somewhat on rumours that the Associated Society were discountenancing the strike. Prices in Rails looked up; but there was not much movement elsewhere. The rumours proving true, Friday's tone became cheerful at the collapse of the strike, and some improving factors abroad aided the improvement. Government issues were brighter, and Consols firm; but before the close a disappointing dividend announcement and a sharp drop in Americans spoilt the day. Saturday was but a dull day; many markets suffering from weakness caused to some extent by internal operations. In the Money Market, there was an ample supply to meet all the demands. Discount rates grew stiffer, but closed below the best of the week. Business in the Gas Market was well up to the mark without any holiday-advent falling off; and transactions were pretty evenly distributed. The tendency, too, was firm and buoyant. Several issues made moderate advances, while none showed a counter-march. In Gaslight and Coke issues, the ordinary was strong and active, with transactions ranging between 105½ and 106¼. The quotation rose ¼, and might have gone still better if the announcement of dividend had come out earlier. In the secured issues, the maximum marked 88¾ and 89½ (a rise of 1), the preference 104¼ and 104¾, the debenture from 80½ to 81½. South Metropolitan was ½ higher, changing hands at from 120½ to 122½; and the debenture realized from 79½ to 80½. In Commercials, the debenture was done at 80 and 80½. Among the Suburban and Provincial group, Brentford old made 254½ (a rise of 1), British from 44½ to 44⅝, South Suburban 121¼ free, ditto debenture 120¼ free, and Tottenham "B" 114 and 114½. Sheffield "C" marked 233. In the Continental companies, Imperial was 1 higher, at from 179 to 180½, ditto debenture marked 94, Union 91, and European 23⅞ and 24. Among the undertakings of the remoter world, Bombay realized 6⅛ and 6 5/16, Cape Town 3, Primitiva 7 5/16 and 7 7/16, ditto preference from 5 5/16 to 5 7/16, Buenos Ayres debenture 97¾ (a rise of 1), and San Paulo preference 12¼.

ELECTRICITY SUPPLY MEMORANDA.

Replying to the Extravaganza of Electricians—"Metalite" Lamp Developments and Company Promotion—Speculation in Wiring and Fittings—Public Lighting Profit Misconceptions—Abolition of the House Fire.

THE recent extravagant statements in electrical advertisement articles have had their reply in a two-column gas advertisement article that appeared in the "Daily Mail"—probably also in other papers—yesterday week; and through it the public will no doubt see the wisdom of not accepting as gospel the *ex parte* declarations of one commercial interest, without hearing what the other side has to say, and intelligently weighing the respective cases. The electricians in their public announcements are spoiling themselves by their wild flights of fancy, instead of keeping to facts; and their efforts must in the end redound to their disadvantage. The gas advertisement-article is headed "Economy in Lighting: Gas at its Worst Cheaper than Electricity at its Best." The article is signed by "John C. Kirkwood." We have an idea that that is not the true patronymic of the author, nor would the writer's godfathers and godmother recognize in "John C." the individual whom they took under their wings in his nascent temporal stage. If we are correct in this surmise, that and the assertion that 2s. 2d. per 1000 cubic feet is the prevailing price of gas in London are the only two pieces of deception (the latter is probably only a slip of the pen) that are to be found in the article. Otherwise, one can conscientiously subscribe to all the remaining statements in the two columns. The writer of the article takes economy as the ground for the capital point in the case for gas lighting; he being sure—as we all are in the gas industry—that on the comparative costs of lighting, a plain word has been much needed. The writer does not follow the stupid blundering, vituperative methods of the electricians, and go bull-headed for the competitor. After a clear and frank statement as to how the public can compare the costs of lighting, he asks that his readers shall not think his attitude towards electricity as an illuminating agent is one of complete antagonism, and that, if he could, he would banish the electric lamp. All he tries to do, and successfully, is

to show that gas for lighting is very much more economical than electricity. In his writing there is nothing of the murderous intention as, for example, there was a week or so ago in the "Electrician," in a paragraph on the Osram lamp. Says that organ of high accomplishment in the art of politeness: "Its [the metallic filament lamp] economies have all along been appreciated; and now that the fragility of its filament is no longer a nightmare, it supplies the most fitting of weapons with which to fight the gas bogies—Let there be war to the death!"

The writer of these terrible words surely wants a holiday. We urge it on his own behalf, and in the interests of the "Electrician." And after order has been restored where disorder now exists, he might study, with a reasonable chance of appreciating truth, the calm and straightforward case that "John C. Kirkwood" places before the public. The advertisement article is educational as to how to reckon the cost of gas and electric lighting. Months and months ago, we advocated more interest in educating the public in the matter of cost calculation. A 50-candle power metallic lamp (not an 8-candle power one as in the case of the "Metalite" advertisements), on a 250-volt circuit, with electricity at 3d. per unit, is taken by the writer. Of the price adopted, electricians cannot complain. Such a lamp (costing 3s. 9d., and requiring renewal at the end of 1000 hours' use) would, at 60 watts per hour, in the 1000 hours, consume 15s. worth of current at 3d. per unit. A 50-candle power (2½ cubic feet per hour) inverted gas-burner would consume in 1000 hours 2500 cubic feet of gas, which, at 2s. 2d. per 1000 cubic feet, would work out to 5s. 5d. in the 1000 hours, when the mantle (costing 4d.) would require renewal. Comparing electrical current and gas, there is a saving of 9s. 7d. for one light in 1000 hours. This gives the answer to the insensate mendacity seen in electrical advertisements, which talks of gas having to come down to 7½d. per 1000 cubic feet before it can compete with electricity! The reference to 2s. 2d. per 1000 cubic feet suggests—2s. 2d. being the price of gas prevailing in South London—that it is to the South Metropolitan Gas Company that thanks are due for this particular answer to the advertisements that have lately had electrical origin. The progress and the advantages of incandescent gas lighting are set forth in the advertisement, as well as the cost of maintenance. It will serve as a model for the advertisements of other gas authorities. It is popularly written, the points are put tersely; and "in the face of the facts and figures, the case for gas on the score of economy, to say nothing of its efficiency as an illuminant, is complete." Of course, in a two-column advertisement article all points cannot be treated upon; but there is much more that has to be said to the public. Installation costs have to be dealt with; in speaking of candle-powers, it has to be explained that the markings on metallic filament lamps are generally purely nominal representations, and not the actual ones; in dealing with maintenance, the brittleness of the metallic filament when cold requires mention; in connection with effective illumination, the injury to the eyesight by metallic filament lamps needs emphasizing, together with the famous statement of Mr. Mordey, ex-President of the Institution of Electrical Engineers, as to the "whip-lash" of such lights on the eyes; and many other points might be treated upon in later advertisement articles. Meanwhile are the plans maturing to bring about co-operative advertising in the gas industry, and not leave the work to the loyalty of a couple of undertakings?

Talking of advertisement articles, our recent surmise that the recent examples in the Daily Press from the "Metalite" lamp people were only the prelude to the flotation of a new Company is correct. On Monday last week, the promoters of the new Company followed the anything but original course of their kind by giving a demonstration of the lamp to representatives of the Press and others, and then sumptuously feeding their guests, so as to put them into a happy frame of mind and full of bright notions before dispatching them to write and talk in laudatory terms of the wonders of the lamp that, it is hoped (by the promoters) the public will understand, in view of the issue of the prospectus, is going to revolutionize the lighting world. We were not invited to view the lamp, nor to take part in the Hotel Cecil function; but we gather from one of our electrical contemporaries that "broad hints" were given to the representatives of the lay press "as to gas and its lethal qualities." An abridged copy of the prospectus appeared in the newspapers on Sunday and Monday; and the most generous estimates are made as to the value of the lamp. Half a million of capital is proposed, of which £380,000 is considered sufficient to go on with. There are many things said that the public will hardly be inclined to accept on the mere *ipse dixit* of company promoters. There is the catch phrase of the "Metalite" puff advertisements as to "40 hours' brilliant light for 1d."—"brilliant," interpreted, meaning the light given by one 8-candle power lamp! There is also the deliberate untruth that the lamp "makes electricity much cheaper than gas." These statements appear as radiations from the picture of a lamp held up by a diademed lady who does not seem to be particularly happy over her allotted duty. It is remarked that the vendors—the Bryant Trading Syndicate, Limited, and the International Filaments, Limited—have arranged for a pretty big picking out of the concern as a reward for their benevolence in allowing the public to participate in this veritable gold mine, which it is predicted will yield a dividend "exceeding 30 per cent. on the entire capital." There is dead-silence as to the profits that have been made hitherto; but the prospects are glorious. At present the estimated minimum consumption of incandescent electric lamps in the United Kingdom is 40 millions per annum; and the promoters claim contracts in hand for 15 million filaments per annum during the next five years. Gas is credited with supplying 90 per cent. of the artificial lighting in the country at present; but—the gas industry must beware—the Metalite lamp is going to alter all that. Gas-works are to become the scenes of desolation, the millions of the industry's capital are to be depreciated to the vanishing point, and the shareholders, officers, and workmen will be permitted asylum in the workhouses of the country. Meanwhile, the shareholders in Metalite Limited will be living on the fat of the land, and pocketing "exceeding 30 per cent." dividends. Profits are estimated at £255,000 per annum. From this on administration, advertising, general expenses, reserves, depreciation, and contingencies, £85,000 can be scattered; and there will be £170,000 for the shareholders, who will get all their capital back in a couple of years or so. Happy thought for the shareholders! Nothing more generous has been witnessed in the financial world for a long time. We can see future monuments to those who were so disinterested as to share their good fortune promiscuously with the public in this way. But off with banter. Seeing that the "Metalite" lamps do not appear to have any virtues that can be regarded as anything more than on a level with those of other excellent makes of metallic filament lamps, the public had better take seriously into consideration the question of future severe competition before investing money in this fresh trading concern, and remember at the same time that the electrical manufacturing business almost generally has not experienced roseate results now for some years. The Metalite prospectus will be worth preserving for future reference.

It is likely that in the next parliamentary session, a large number of municipal electricity undertakings will be promoting a joint Bill for enabling them to adopt free wiring and to trade in fittings. Quietly there is activity in organizing support for a Bill. The Electrical Contractors' Association, who succeeded in getting exterminated a similar power in the last General Electric Supply Act, which amended its predecessors in several important respects, will keep an eye on what is being done in this connection. So must the large ratepaying gas companies; and they will be able to follow the example the municipal authorities gave in connection with the Standard Burner Bills this session, and amalgamate in opposition. There are a few things about municipal electrical speculation it will interest Parliamentary Committees to hear. There has been all too much of this speculation; and gas companies among the chief ratepayers of the districts have felt it. Touching this question, an interesting statement was made by Mr. Dykes at a recent meeting of the Beckenham District Council. He asked the members of that body to give careful attention to the returns for the last financial year as to free wiring. There were, he said, 27 consumers; and the average cost per lamp was 23s. 4d., while the average receipt from the sale of current had gone down to 3s. 9d. Some time ago the average receipts were 7s. 9½d. per lamp. But they had gradually fallen to 3s. 9d., while at the same time the cost of connecting-up the installations was increasing. One consumer with ten lamps cost £15 7s. 8d., or 30s. a light. The return obtained for this was 15s. 10d. Another consumer with twenty lamps cost £24 8s. 10d.; and his return was £4 17s. 6d., or 4s. 10d. per lamp. A third consumer with twenty lamps cost the Council practically the same; but the receipts were £2 3s. 9d., or only 2s. 1d. per lamp. There is no justification for such an expenditure; and the receipts do not pay the standing charges. These will be useful figures when opposing the proposed further speculation of municipal authorities.

Plain truths are not tolerated by some folks at Hastings. Because of this, the public lighting question is continually in a state of ebullition there. The cost of converting the street-lamps to electricity means a considerable sum. This is being charged on the rates annually; whereas a much smaller amount would give the ratepayers the benefit of inverted gas-lamps such as are being adopted by borough councils—including electricity-supplying authorities—in the districts of the two largest gas companies in London. The intelligence of these authorities is not in any way inferior to that of the governing body at Hastings, whose administration has required a Special Committee of Investigation to attempt to correct the muddles that have accumulated from past procedure. It is the increased economy and efficiency of the inverted gas-lamp that has enabled it to leave the metallic filament electric lamp behind where local government pursues its legitimate functions untrammelled by an electricity undertaking, or undue affection for one. There is thus initial and perpetual financial loss to the ratepayers by the mistaken policy of the Hastings Corporation. Take things as they are, the Gas Company now charge annually 2s. 6d. per lamp less than the electricity undertaking. There is another aspect. The writer of "Flotsam and Jetsam" in the "Hastings Observer" says that "whereas the profits secured by lighting the public lamps with gas go to the Gas Company, the profits secured by lighting them with electricity go to the Electricity Department—in other words, to the ratepayers." Do they? The question is: Are there any profits accruing to the Electricity Department from this public lighting at £3 5s. per lamp? It is no use our journalistic friend writing on this question without going to its substratum. Has he investigated the whole costs of electricity generation, and establishment and capital charges? Has he asked himself the question whether the units charged at extraordinarily low prices, which do not comprehend the whole of the charges per unit of electricity accounted for, contribute more than the higher priced units (which do comprehend the whole of these charges)

to the large annual deficits of the undertaking? Does he know that the public lighting low-priced units form the peak to the high-priced unit lighting load, and that the generating costs of the peak are always higher than those forming the private lighting base? We strongly advise him to look into these questions before he again speaks of "profits" going to the ratepayers, more especially while the ratepayers have annually to fill a deficiency in respect of want of profits. It is a pity to unconsciously play the puppet even with the best motives in the world. The same writer argues that the Electricity Department is the property of the ratepayers; and therefore it is to the "interest of the latter that the consumption of the light [? electricity] should be increased." This takes us to the very large question as to the legitimate functions of a municipal body, and as to whether it is not their duty to administer each public service independently on the lines of the utmost economy and efficiency. It cannot be to the interest of the ratepayers to have nominal equality in the price paid for public electric lighting with that paid for gas lighting, with less illuminating power and efficiency, and then have to pay heavily for conversion of the lamps, and have a big deficiency to meet on the electricity concern—a deficiency brought about by the charges for electricity not supplying sufficient revenue for meeting financial responsibilities, and the while nothing is being put by for the morrow of the undertaking.

The Engineering Correspondent of "The Times" recently called attention to Mr. C. H. Merz's evidence before the Local Legislation Committee of the House of Commons when the smoke clauses of the London County Council Bill were under consideration. Mr. Merz has always been one of the champions of plant concentration; and he estimates that, if the electrical power required for London was all generated at a few large stations, there would be a saving in coal of about 6 million tons a year. Having mentioned this striking estimate, the Engineering Correspondent permits himself to continue in this manner: "It has for some years past been evident that by far the best, and, indeed, the only practical, way of reducing the smoke nuisance, is for local authorities to do all in their power to encourage the erection of large power stations with very tall chimneys. The number of domestic contributors could thus be diminished, because electric cooking and heating would be much cheaper. . . . There is no one more anxious than the modern central station engineer to reduce smoke pollution by coal economy, by the substitution of one tall chimney for hundreds of short chimneys, and by the gradual abolition of the house fire." We should like to know why the erection of large electrical power stations is "the best, and, indeed, the only practical, way of reducing the smoke nuisance." Was not Mr. John Burns telling a deputation he received a short time ago, that the Gaslight and Coke and the South Metropolitan Companies (excluding the Commercial and other concerns operating on the borders of the two large Companies named) had fixed, not counting privately purchased ones, no less than 1,300,000 gas-fires, gas-cookers, ring-burners, and gas water-heaters? We quite agree there is no one more anxious than the modern central station engineer to bring about the gradual abolition of the house fire. But it so happens that gas-heated appliances are the more economical way of doing this. Naturally, the Engineering Correspondent of "The Times" cannot know everything; and the facts as to gas seem, so far as he is concerned, to have missed their way.

The Livesey Professorship at Leeds University.

In the "JOURNAL" for the 21st ult. (p. 861), it was mentioned that the Council of the Leeds University had passed a resolution recording their deep sense of the honour done to the University by the offer of the fund raised as a memorial to the late Sir George Livesey for the endowment of a Professorship of Applied Chemistry relating to the Coal Gas and Fuel Industries. They have now issued a circular conveying to the donors of the fund their grateful acknowledgments for the munificent gift. They regard it as a signal honour that a professorship commemorating the life and work of Sir George Livesey should be associated with the University of Leeds. They point out that their efforts for the provision of higher education in Applied Science will thereby be greatly strengthened and encouraged; and they express the earnest hope that the work carried out by the department of the University to which the new professorship is assigned will amply justify the generosity and confidence of the founders.

The erosion of reservoir banks by wave action may be reduced greatly, according to a bulletin of the United States Department of Agriculture by Mr. P. E. Fuller, by floating a boom of old railroad ties or other timber round the inner banks. The ties should be held together by cleats securely nailed, and the entire boom anchored in a line 3 feet from the banks.

At a recent meeting of the Council of the Roads Improvement Association, the resignation of Mr. Rees Jeffreys as Hon. Secretary was received; and the Council unanimously congratulated him on his selection for the position of Secretary to the Road Board. Mr. Wallace E. Riche was appointed Secretary, in succession to Mr. Rees Jeffreys. A statement of the future policy of the Association was approved, and ordered to be issued, in which it was set forth that a new and important field of activity is now open—viz., to select and materialize schemes for the construction and improvement of roads, and to lay such schemes before the Road Board for consideration.

OBITUARY.

GEORGE CARELESS TREWBY.

WE learnt with much regret last Wednesday of the sudden death on the previous day, as the result of heart failure, at his residence, Fenton House, Hampstead Heath, N.W., of Mr. George Careless Trewby, late Chief and Consulting Engineer of the Gaslight and Coke Company. He was in his 72nd year. It may be remembered that towards the close of 1900 arrangements were made by the Directors to relieve Mr. Trewby of active work; but they could not be carried into effect till about four years later, when Mr. Thomas Goulden succeeded him as Chief Engineer. When Mr. Trewby's retirement was in contemplation, we published a full account of his life-work; so that it is only necessary now to give an outline of it.

Mr. Trewby entered the gas industry in 1853, when he became pupil of the late Mr. F. J. Evans, the then Chief Engineer of the Gaslight and Coke Company. His principal work was the supervision of the construction of a gasholder and tank which were being erected at Page Street, Westminster. He afterwards went to Constantinople to fill the position of Engineer to the Ottoman Government. On the termination of this engagement, he returned to England, and took charge of the Brentford Gas-Works; but early in 1865 he again entered the service of the Gaslight and Coke Company, and was the Resident Engineer at the Horseferry Road station till 1870. He was that year transferred to Beckton, where the works which had been started there were only partly finished; and upon him devolved the duty of organizing the undertaking. Two years later came the memorable strike of stokers, every one of whom left the works. However, such was the firmness displayed by Mr. Trewby in those trying circumstances, that the men were completely beaten; and for seventeen years afterwards the works were conducted in peace and quietness and were brought to a high state of perfection. In 1884, Mr. Trewby was appointed Constructing and Carbonizing Engineer of the Company; and he carried on the duties of this office with notable results till August, 1891, when a further change was made in his official designation—it being altered to Consulting and Constructing Engineer. From 1884, all extensions and reconstructions had been carried out under his supervision; and he introduced a large number of labour-saving appliances at the different works—the new pier at Beckton being one of his masterpieces. Its equipment includes powerful hydraulic cranes and grabs for unloading coal in the Thames, and transmitting it to waggons for conveying it to different parts of the establishment; and it speaks well for the installation that it has been copied by several other companies and firms for unloading their ships. The foregoing particulars, in conjunction with those contained in the previous article, will show the extensive character of Mr. Trewby's work for the Company with whom his name was for so many years associated.

Mr. Trewby gave important evidence before the Departmental Committee appointed in 1898, and presided over by Lord Belper, to inquire into the manufacture and use of water gas in the Metropolis; also before the Powers of Charge Committee, presided over by Mr. Oldroyd, in 1900, and before Lord Rayleigh's Committee on Gas Testing in the Metropolis in 1904. He was one of the witnesses in the action brought by Messrs. Graham, Morton, and Co. against the Compagnie L'Union des Gaz in connection with the Milan Gas-Works contract. But since then he had lived a good deal in retirement.

Mr. Trewby joined the British Association of Gas Managers in 1870, and passed into the Gas Institute, of the Council of which he eventually became a member. He was one of the Vice-Presidents for 1887-8. But, in association with a number of his colleagues, he severed his connection with the body, and actively assisted in the formation in 1891 of the original Institution of Gas Engineers, of which he was the first President. On the constitution of the present Institution in 1903, he became a member; and his name was on the roll at the time of his death. He was admitted as an associate member of the Institution of Civil Engineers in 1866, and was transferred to the class of members in 1875.

The funeral took place at Hampstead Cemetery on Saturday afternoon; the interment being preceded by a service at Christ Church, Hampstead, where Mr. Trewby had worshipped for 25 years, and of which at the time of his death he was Churchwarden for the third year in succession. He was a member of the Committee of the Mount Vernon Hospital for Consumption, &c., and also of the Committee at Northwood, the Home for Sailors' Daughters, and many other bodies. He will consequently be greatly missed not only by his relations and friends, but by a large circle of acquaintances with whom he worked or came in contact. The death of Mr. Trewby will not dissociate the name from the gas industry, inasmuch as his son, Mr. Lawrie Trewby, is Engineer and Manager of the North Middlesex Gas Company.

We have just learnt of the death of Mr. FRANK LEIGH, son of Mr. Arthur Lea Leigh, the Managing-Director of the Witney Gas-Works, at the early age of 28, from the combined effects of pleurisy and double pneumonia, complicated by a weak heart. Mr. Frank Leigh assisted his father in the management of the gas-works at Witney, and was a young man of great promise, and of a very bright and genial disposition. It will be remembered, from a

recent notice in our columns, that he had just patented an automatic pressure regulator for gas-governors, and had introduced into the works at Witney several improvements in the mode of working, as may be judged from the fact that during the half year ending June 30 he had produced from 498 tons of coal 6,483,000 cubic feet of gas, or 13,018 cubic feet per ton, of which 11,968 cubic feet were accounted for. Mr. Leigh gained a bronze medal in the City and Guilds examinations last year in "Gas Supply," and promised, had he been favoured with robust health, to occupy a high position in his profession.

PERSONAL.

Mr. WILLIAM TOMLINSON, Manager of the Rochdale Corporation Water-Works, is about to resign, owing to ill-health and advancing years. He has 51 years' service to his credit, 26 as Manager; and he is one of the oldest officials of the Corporation. It was in 1859 that he entered the employ of the old Water Company; and in 1866, when the undertaking was acquired by the Corporation, he was taken over with other officials. He was appointed Deputy-Manager in 1875, and Manager in 1884; and since then the works have been greatly extended.

An interesting and picturesque ceremony recently took place in the Council Chamber of the Town Hall, Great Yarmouth, when the Mayor (Mr. T. W. Swindell) presented the honorary freedom of the borough to Sir R. H. INGLIS PALGRAVE, F.R.S., "as a token of the appreciation by the Council and by the burgesses at large of the eminent services rendered by him to the State and to the borough." The occasion was the opening of the new Grammar School, of the Governors of which institution Sir Inglis is the Chairman. He is also, as some readers are aware, Chairman of the Great Yarmouth Gas Company.

THE RELATION OF CALORIFIC VALUE TO ILLUMINATING POWER IN LONDON GAS.

THE results of the tests made in the testing places controlled by the London County Council, of which summaries have been from time to time presented in the "JOURNAL" [*vide* the article on "The Quality of London Gas" in last week's issue, p. 179, and the earlier articles referred to therein] admit of some interesting inferences being made as to the relation between calorific value and the illuminating power of the gas supplied. The comparison is the more interesting at the moment because Professor Frankland and other witnesses before the House of Commons Committee on the Standard Burner Bills, from the results of these testings, drew deductions as to the relation between the calorific value and the illuminating power of gas supplies in general.

In the Metropolis, as is well known, two of the Companies are supplying, in the greater part of their districts at least, a mixture of coal gas and carburetted water gas; while the third Company —the South Metropolitan—are still supplying neat coal gas. The figures published in the "JOURNAL" from time to time show, *inter alia*, the average calorific power and average illuminating power for each quarter of the gas supplied by each Company, as shown by the testings made at all the testing-places for each Company. The figures for the calorific tests are not strictly comparable with those for the photometric tests, because there are three testings for illuminating power made each day at each testing-place, and only one testing for calorific power, which testing, moreover, is not necessarily made immediately before or after either of the testings of illuminating power. This lack of synchronism between the calorific and the photometric testings becomes very important when the results of only a few testings are compared, as it may be that the calorific power reported refers to gas of very different illuminating power from that reported for the same period. The supply necessarily varies in quality from hour to hour, and the six or seven testings of calorific power made at a testing-place in one week may none of them have been made within one hour of any one of the eighteen or more testings of illuminating power made during the same week. Hence on such a short period of time it would be totally unfair to make any deduction as to the relation between the calorific value and the illuminating power of the gas supplied. If, however, a longer period is taken—say, one quarter, or thirteen weeks, and if the results from a number of testing-places are averaged for that quarter—it may fairly be assumed that the defect of any lack of synchronism between the two sets of testings will be relatively small, and conclusions may more reasonably be drawn from the averages of such extended series of testings as to the relation between calorific and photometric values. Acting on these considerations, we have drawn up from the quarterly results, published in the "JOURNAL" at intervals, the following table showing the average net calorific power corresponding to the average illuminating power of the gas for each quarter of the last 3¼ years for each of the three Metropolitan Gas Companies. The results are arranged in order, according to the rise in the average illuminating power of the gas instead of chronologically; but the year and quarter are indicated in each case.

Dealing first with the coal gas supplied by the South Metropolitan Company, it will be observed that the extreme difference between the lowest average illuminating power for any one quarter and the highest is 0·93 candle, and the difference in calorific power for the same quarters is 3·1 calories. This is equivalent to a fall of 2·47 per cent. in net calorific power for a fall of one candle in illuminating power. This deduction might be reasonably applied generally if the two quarters which happen to begin and end the statement could be taken by themselves as fairly representative of the correspondence between calorific value and illuminating power at the particular candle powers shown. But that it is not fair to take any two quarters, extreme or otherwise, and argue from the average figures obtained for them that a certain relation subsists between the illuminating power and the calorific value of coal gas, may be illustrated by referring to two other quarters in the list, which display totally different relationship.

Corresponding to an average illuminating power of 16·21 candles for one quarter, we find an average net calorific power of 134·3 calories; while corresponding to an average illuminating power of 16·64 candles, we have an average net calorific power of 132·8 calories—that is to say, an increase of 0·43 candle is attended by a decrease in calorific power of 1·5 calories. From these two quarters' figures—which, be it noted, are not results of isolated testings, or even the mean results for a short period, such as one week, or for one out of six testing-places, but the average results of daily testings at six testing-places for the whole of a quarter in each case—it may be deduced that a fall in illuminating power of one candle is attended by a rise in net calorific power of 3·5 calories, or 2·6 per cent. Thus, taking individual quarters, and excluding the rest, it may be legitimately inferred that a fall of one candle in illuminating power is accompanied either by a fall of 2·47 per cent. or by a rise of 2·60 per cent. in calorific value. It would be unfair to say that one conclusion should be preferred to the other in the absence of other evidence.

Glancing down the columns for coal gas, it will be seen that there is no continuous or uniform increase in calorific value corresponding to an increase in illuminating power. The results are erratic; and by selecting particular quarters for comparison, it is easy to obtain support for the theory that the net calorific value of coal gas falls with a fall in illuminating power, or for the converse theory that the net calorific value of coal gas rises with a fall in illuminating power. If we review the whole of the figures for the fourteen quarters, it would not be altogether unreasonable to infer that the calorific value of coal gas falls, on the average, by two calories, or 1·5 per cent. for a fall of one candle in illuminating power; but this conclusion takes into account the results for the first and second quarters of the present year, which appear to represent (as was pointed out in the article on the "Quality of London Gas" in last week's "JOURNAL") a new departure in methods of carbonization on the part of the South Metropolitan Company. In fact, the results for the last twelve months stand on a somewhat different basis from earlier results.

If the earlier results—that is, those extending over 2¼ years continuously—are taken, the only legitimate conclusion which can be drawn from them is that there is no fall in net calorific power

SOUTH METROPOLITAN GAS COMPANY—(*Coal Gas*).				GASLIGHT AND COKE COMPANY—(*Mixed Gas*).				COMMERCIAL GAS COMPANY—(*Mixed Gas*).			
Year.	Quarter of Year.	Illuminating Power.	Net Calorific Power.	Year.	Quarter of Year.	Illuminating Power.	Net Calorific Power.	Year.	Quarter of Year.	Illuminating Power.	Net Calorific Power.
		Candles.	Cal. per Cub. Ft			Candles.	Cal. per Cub. Ft			Candles.	Cal. per Cub. Ft.
1910	I.	15·86	130·9	1910	II.	15·14	122·2	1910	I.	14·47	122·7
1910	II.	16·00	131·0	1910	I.	15·40	124·3	1909	IV.	14·57	125·0
1909	IV.	16·12	132·1	1909	IV.	15·82	125·5	1909	III.	14·71	125·5
1907	I.	16·21	134·3	1907	II.	16·60	131·4	1910	II.	14·73	123·3
1909	III.	16·23	130·5	1907	I.	16·65	133·4	1909	I.	14·81	126·1
1908	I.	16·24	132·9	1907	IV.	16·70	132·7	1908	IV.	14·85	124·1
1909	I.	16·37	133·0	1909	I.	16·73	130·7	1909	II.	14·90	126·0
1907	III.	16·40	132·4	1909	II.	16·75	130·0	1907	IV.	15·01	127·3
1907	IV.	16·45	133·0	1909	III.	16·77	129·1	1908	I.	15·05	127·3
1907	II.	16·50	133·4	1908	I.	16·77	132·1	1908	II.	15·19	127·3
1908	II.	16·54	132·6	1908	II.	16·92	131·4	1907	I.	15·25	127·3
1909	II.	16·64	132·8	1907	III.	16·95	133·8	1908	III.	15·36	127·5
1908	IV.	16·71	133·9	1908	IV.	16·96	132·0	1907	III.	15·43	127·4
1908	III.	16·79	134·0	1908	III.	17·09	131·5	1907	II.	15·72	128·5

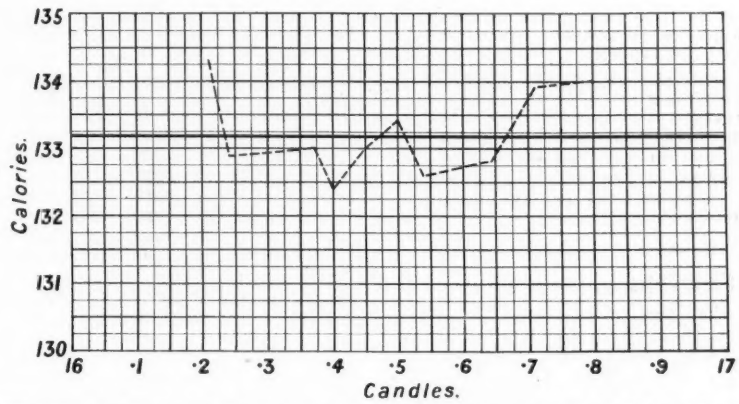


Diagram showing the Relation between the Illuminating Power and the Net Calorific Value of Coal Gas—Deduced from the Results of Two-and-a-Half Years' Testings by the London County Council of the Gas Supplied by the South Metropolitan Company.

with a fall in illuminating power. This is clear from the annexed diagram, in which the average results for each quarter from Jan. 1, 1907, to July 1, 1909, have been plotted out, as shown by the dotted line, and a curve (the continuous line) drawn therefrom showing the relationship between calorific power and illuminating power. It will be seen that this curve approximates to a straight line, showing an average net calorific value of 133·2 calories per cubic foot, applicable equally to gas of 16-candle power and to gas of 17-candle power. How much further in either direction the curve continues in a straight line it is impossible from the results of these testings to predict. About the 1st of July, 1909, there appears to have been a change in the character of the gas produced by the South Metropolitan Company, and with a gradual and continuous fall in illuminating power, there was a sudden and appreciable fall in the net calorific power. If we exclude the effect of this sudden drop—due, doubtless, to some change in methods of working—we find that since that date the calorific power of the gas supplied has shown no falling off corresponding to the gradual reduction taking place in illuminating power.

Having regard to the foregoing conclusions, especially those referring to the results obtained for a continuous period of 2½ years, it is interesting to observe a statement made in evidence before the House of Commons Committee on the Standard Burner Bills on the 13th inst., by Professor Percy Frankland. In answer to Question 3300, he said: "I have examined the reports by the London County Council on the daily examinations of the London gas; and in the case of the South Metropolitan Company, I have set out here the averages for each week at each of their stations. It is put in this way: Taking the highest average candle power and the lowest average candle power, we get such and such a drop in candle power, and the corresponding heating values of those gases has been put down, and in every case there is a diminution in the heating power when the illuminating power goes down. What is more, the average for the percentage lost in calories per one candle works out to 2·9 calories; so that bears out exactly what I said in respect of the experiments which I made at Liverpool—that for a drop of one candle there is an average reduction in calorific power of 2·9 per cent. I said 3·1 per cent."

We have shown that, taking the extreme cases in favour of Professor Frankland's contention, the average reduction in calorific power is 2·47 per cent., instead of 2·9 per cent. for one candle; while equally legitimately it may be contended that there is an average increase in calorific power of 2·6 per cent. for a drop of one candle. Excluding the ups and downs of individual quarters, we may say, broadly, that the testings of coal gas in the case of the South Metropolitan Company for a period of 2½ years continuously at all their testing-places show that there is no reduction in calorific power for a drop in illuminating power. Professor Frankland must have founded his statement, which is disproved by the figures here quoted, on averages for too short a period, which, as we have explained, and as is clear from the tabular statement, are likely to lead to wholly erroneous conclusions. Nevertheless, it is a pity that such statements, based on inadequate data, should be given in evidence before a Parliamentary Committee who are dealing with a question of such immense industrial and economical importance as that of the adoption of the "Metropolitan" No. 2 argand as the standard burner.

The results of testings of the mixed gas supplied by the Gaslight and Coke Company do not admit of any very definite conclusions being drawn as to the correspondence between a fall in illuminating power and a fall in calorific value, because there are not yet sufficient figures available since the standard of quality of the Company's gas has been reduced from 16 to 14 candles. When the Company were working to a 16-candle standard—*i.e.*, prior to Oct. 1, 1909—the results do not show any consistent fall in calorific value corresponding to a fall in illuminating power. With the adoption of the 14-candle standard, however, there has been a sudden drop in calorific power, the exact bearing or intensity of which it would be unfair to estimate until more figures are available for gas which has been supplied by the Company to the lower standard.

Passing on to the Commercial Gas Company's results, it will be seen that the mixed gas supplied by them shows pretty consistently for a drop of one candle a fall of about 4 calories, or about 3·1 per cent. This corresponds fairly closely with Professor Frankland's figure for the fall in calorific power corresponding to a drop of one candle in the gas supplied by the Liverpool Corporation, which likewise is a mixed gas. It is in respect of his evidence in regard to the calorific power of coal gas that he was seriously at fault.

INSTITUTION OF DUTCH GAS ENGINEERS.

Annual Meeting in Brussels.

THE Annual Meeting of the Institution of Dutch Gas Engineers was held in the Congress Hall at the Brussels Exhibition from the 6th to the 8th inst., under the presidency of Heer J. VAN ROSSUM DU CHATTEL, the Engineer of the Amsterdam Municipal Gas-Works. The following are some extracts from

THE PRESIDENTIAL ADDRESS.

The address opened with a cordial welcome by the President to his fellow-members of the Institution, and to the members of sister Institutions who were present. This was, he said, the first time they had met abroad; and he thanked all who had made it possible for the Committee to look forward with much confidence to a successful issue of the meeting. He also thanked the Committee of the Exhibition for placing the Congress Hall at their disposal gratis, and the members of the Institution for electing him President. He then passed on to deal as follows with some of the principal topics of interest to his colleagues.

SOME ACCIDENTS AND THEIR LESSONS.

The terrible disasters at Hamburg and Geneva, which, alas! besides causing loss of capital, also claimed a great number of victims, are still foremost in your memories; and they teach us that in the midst of life we always find ourselves in death. Besides this, they teach us that our industry may still be called a dangerous one, if all the necessary precautions have not been taken for ensuring safety, both in construction and working. To the "Golden Rules" of Mr. Newbigging, one more might be added—viz., "Do not trust the absolute gas-tightness of your valves." If one has to disconnect mains, loosen joints, or open and close valves, one must always bear in mind that these valves may also convey gas; and some measures should be taken to render the gas harmless. There ought to be written regulations, and everybody assigned his place and work; and none but competent hands should be entrusted with the duty of turning valves. The control of the work should really be in the hands of only one person. Beyond this, all other ordinary measures to ensure safety must not be neglected.

The recent disasters have further taught us that it is desirable to leave sufficient room between the different buildings, the gasholders, &c., on gas-works—in a word, not to crowd up the works. In course of time, in consequence of too rapid extensions, conditions have arisen in gas-works of which, from the point of view of safety, one cannot possibly approve. If the necessary room for movement is wanting, the danger of an explosion or other accident is much greater than when there is ample space. I am aware that criticism is easy, and that before indulging in it one ought to consider all the circumstances. For example, at the new South Gas-Works in course of construction at Amsterdam, the erection of a gasholder on the Amstel has drawn forth a protest for æsthetic reasons. People have forgotten that, from the point of view of safety, a decision has been come to—and very rightly, as Hamburg has taught us—to build the retort-house and gasholder as far from each other as possible. If the gasholder had not been erected on the Amstel, the retort-house would have been put up there, in the neighbourhood of the villa-park afterwards to spring up there; and then people would have had still greater reason to protest than they have now. These outcries about disfigurement seem to me to be much exaggerated.

"One man's fault is another man's lesson," says the proverb; and, for our watery country, the lesson taught by the recent French inundations may also be of use. Though only one or two works were obliged to stop the supply of gas, and the electric light and power plants were much more seriously affected by the high water than the gas-works, yet a doubt has arisen as to whether the old dogma that these works should be erected on the lowest part of the district of supply may not be accepted too strictly. Anyhow, in future the designer of gas-works will have to keep in view the fact that the water in the rivers may rise to an abnormal height, and that the retort-settings should be built in such a manner that even then the furnaces will be able to continue working.

The Labour Question.

The labour question still demands our attention. Though it cannot be denied that in many places the conditions of labour leave much to be desired—the wages being too low, and too little being done for the labourer—yet some recent strikes prove that the way in which people proceed is sometimes reckless, and often criminal. Our colleagues in North Italy can bear witness to this. Workmen who were in very favourable circumstances, and found themselves in a better condition than most of their class on the Continent, or even in Great Britain, struck when their most unreasonable demands were not complied with. It is most fortunate that the Italian Gas Companies, in the very difficult circumstances in which they were placed, knew how to oppose such shameful compulsion, and that the strikes were an utter failure. The same result has attended the great strike at the Stockholm Gas-Works, which took place against the wish of the organized labourers and others who were willing to work. The strike had been expected; but, thanks to the excellent measures adopted—the formation of a reserve, consisting of engineers and technicians, clerks, collectors, meter-takers, &c., with soldiers to watch the works where necessary—the strike totally failed, and its only fortunate consequence was the very desirable removal of some bad elements. The experience has been gained that the gas-works are able to go on with the assistance of a voluntary staff, consisting chiefly of their own hands; while the stricter obligations since the strike imposed by the Government on workmen engaged in those industries of which the continuance is indispensable to the general safety of the community, may guarantee us against a repetition of what has happened.

New Processes Affecting the Gas Industry.

There are certain industries which, without actually belonging to that with which we are connected, are worth notice, because they may have great influence on it. Last year my predecessor drew your attention to the product coalite; and now it is being made in a few English gas-works. It is made at Plymouth and also at Wednesfield. Some tons of it were placed at my disposal, and the fuel appeared to be highly satisfactory in heating-stoves, in which usually anthracite was burned, and also in the Singhalang (Dutch) coke-stove. We had to deal with a very pure fuel, containing only 3·65 per cent. of ash, 81·65 per cent. of carbon, 3·63 per cent. of hydrogen, 1·48 per cent. of nitrogen, 1·20 per cent. of sulphur, and 6·04 per cent. of oxygen, which at the same time gave 13,743 B.Th.U. gross, and therefore would be only slightly inferior to Belgian anthracite. It was a much better fuel, therefore, than had been obtained in 1907, the results of the examination of which were published by me at the time in the pages of "Het Gas."

Apart from other reasons, it seems to me that coalite will never be manufactured on so large a scale as to cause fear of any serious dangers for the gas industry, because, in the first place, the quantity of coal to be carbonized is twice as much as it is for coal gas. Consequently, twice the present quantity would have to be stored, either in the shed or in the open air; and this is almost impracticable. In the second place, the coalite produced would be about twice as much in bulk as the coke now resulting from making gas; and storage-room for it would be wanted. Thirdly, though the tar is certainly of better quality than that which is now produced in ordinary carbonization, the same remarks that have been made about coke will apply. Therefore, at the most, I see a future for coalite only in very special cases.

Another subject that claims our attention is the preparation of fuel from peat, according to Dr. Ekenberg's process. Briquettes containing 3 to 4 per cent. of water are made out of compressed peat. They are very hard, and when lighted will burn with a luminous flame. A briquette analyzed in the laboratory at the Western Gas-Works at Amsterdam contained the following constituents (represented in percentages): Water, 3·59; carbon, 63·19; hydrogen, 7·08; nitrogen, 1·34; sulphur, 0·31; oxygen, 21·48; ash, 3·01; and it had a calorific value of 12,815 B.Th.U. In addition to briquettes, charcoal and coke can be made out of the compressed cakes. We can also gasify them, with a production of 16,316 cubic feet of ± 584 B.Th.U. gross per ton. With this process, therefore, various substances of different values can be obtained; and as our country (Holland) is very rich in peat, the process cannot be immaterial to us. Factories are being erected for its production. It will be necessary to await results; but we must not lose sight of this matter.

Another process which may be of some importance to us is the manufacture of briquettes from house refuse. By means of steel crushers, the refuse is broken up and afterwards combined and formed into briquettes, which may be used as fuel. As in this process coal tar may be utilized, as proved experimentally at the Municipal Gas-Works of Amsterdam, possibly means have been found by which we may get rid of our tar to better advantage than has been the case in recent years, in consequence of the existence of syndicates and over-production by coke-ovens. The manufacture of briquettes from house refuse is already being carried on by the Borough Council of Southwark, in London, and by the Société des Nouveaux Agglo Mérés Combustibles at St. Ouen. It will therefore be wise to follow the development of this process.

Review of the Industry Last Year.

The year 1909 was not disadvantageous to the gas industry. The general depression in trade came to an end, and a gradual improvement might be perceived. The population, which in many towns did not increase and even was declining, began to augment; and so did the production of gas. The prospect was consequently promising. If present expectations are realized, considerable extensions of plant or new buildings may well be expected in many gas-works.

The price of coal was moderate last year. But December brought us no winter; and, everything considered, by the lower price realized for coke, we lost part of the advantage gained by the low price of coal.

The progress of our industry is proved by the construction of new works and the extension of those in existence. At Amsterdam, a resolution has been passed for pushing on the construction of the third gas-works; Rotterdam has also decided to construct a third works; while at Deventer the existing works are being replaced by entirely new ones. Some weeks ago, the money for carrying out a large extension was granted at Tilburg. New gas-works have been constructed, or are in progress, at other places. At Doesburg, the works have passed from private hands into those of the Municipality. The gas supply of smaller municipalities by large ones is not at present favoured in Holland.

Improvements in Plant and Lighting Appliances.

Our fellow-member, Heer Bauduin, has again deserved well of our industry, for he has invented a gasholder without water-lute, for which the firm of Aug. Klönne, of Dortmund, took out a German patent in September, 1908. It has been cleverly designed.

Last year my predecessor showed that much remains to be done by lamp manufacturers in regard to the easy manipulation of gaslight. In connection with this subject, it is a pleasure for me to be able to call your attention to the new gas-lighters which have of late been placed on the market. [The President gave some particulars of the "Dacolight" and Horstman controllers.] Another automatic lighter which is to be tried on a large scale at Amsterdam is the Robson,* the clock of which needs winding only three times a year. However, for this apparatus an increase of pressure, though but very slight, is necessary. I think this an objection, especially for Amsterdam, with its many district governors. As the manufacturer offered to allow a trial of some fifty of these controllers gratis, and my staff's opinion about them being very favourable, we shall carry out the trial in the course of the year; and if the result is satisfactory, we shall procure some of them.

As a novelty in the manufacturing department, I should mention the Burkheiser system for the purification of gas from sulphur and ammonia, which has already been applied in a testing plant at Hamburg.† The gas first passes through a purifier filled with peculiarly prepared oxide, which acts very powerfully, and afterwards a washer with a water-spray. If the oxide is saturated with sulphuretted hydrogen, the stream of gas is reversed, and passes through a second purifier, after which the air in purifier No. 1 is exhausted. The sulphur is converted into sulphur dioxide, which, combined with ammonia, forms sulphate. By the use of the apparatus, there is economy of space, labour, and steam; and a very fine sulphate is obtained. It will thus be seen that the chemists are not idle, and are assisting in the development of our industry.

Carbonizing Chambers *v.* Vertical Retorts.

It still remains for me to offer a few remarks on the important question of the use of chamber ovens as opposed to settings of vertical retorts. From every direction something good may come, as pictorial art has proved; and that is the case here. Circumstances will have to determine the choice. Among the various systems of vertical retorts one would be inclined to prefer greatly those with continuous carbonization. But it does not yet seem certain that experience has sufficiently shown whether all technical objections may be considered as removed. What I have seen as well as heard in reference to this in England makes me greatly doubt it.

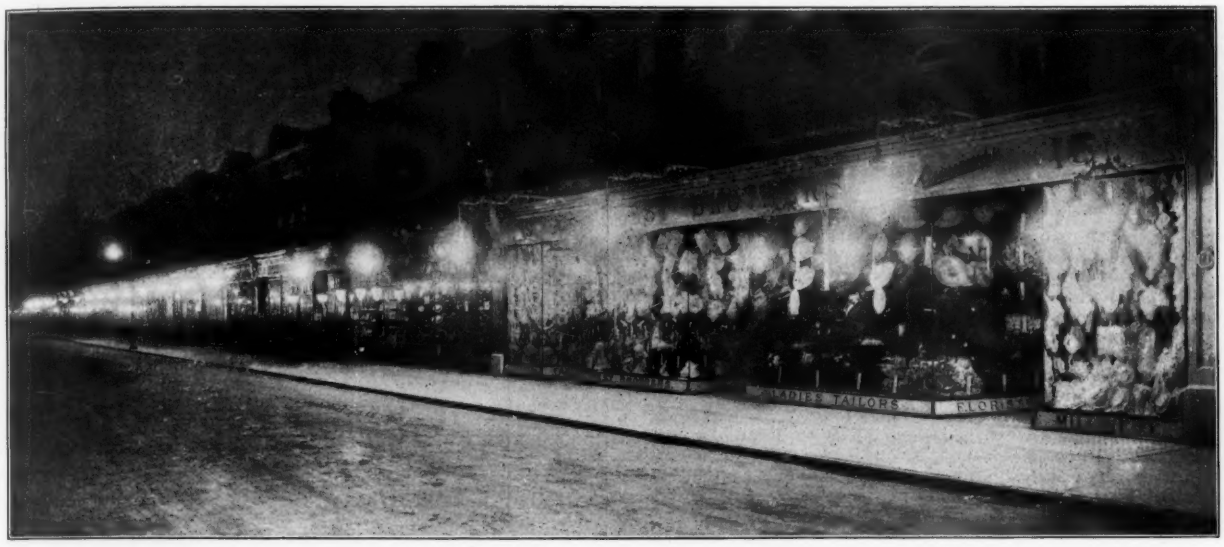
In the meantime, the Bueb retort continues its triumphant course; and at the April meeting of the Märkischer Verein von Gasfach Männern at Berlin my impression was that the chamber ovens could only with much difficulty maintain their standing against the vertical systems. What the future will bring us, time will show. I do not think that this will be far off; for, if I am rightly informed, chamber ovens and vertical retorts will soon be constructed in Holland, and this will enable me to decide with better judgment, for one or two short visits to gas-works where both can be seen in operation allow of only a superficial impression.

The President concluded by declaring the meeting open.

* See "Journal," Vol. CIV., p. 332.

† See "Journal," Vol. CVIII., pp. 311, 326, 477.

THE DEVELOPMENTS OF HIGH-PRESSURE GAS LIGHTING.



An Example of Parade Lighting by Keith High-Pressure Inverted Lamps.

THE progress of high-pressure gas lighting, from all points—efficiency, costs, and as an important auxiliary in the commercial work of the gas-supply industry—has been by such rapid and large strides that one has to deliberately turn one's mind to the subject, and meditate upon it, to fully realize the current position. In this article, however, we will confine ourselves to some of the latest intelligence concerning the work in different directions that has been, and is being, done which has a bearing on the trading interests of gas supply. Considering those interests, there should not in these days be a single gas company or municipal gas department without an installation of high-pressure and high-power lamps somewhere in the district of supply to demonstrate, if only for advertising purposes, the remarkable efficiency and light-yielding power of such lamps. Examples of some of the best of modern lamps of various types ought to be kept constantly in evidence as an illustration of what gas can do, and as a standing answer to the claims of electrical origin as to the superiority of their particular forms of lamp. There is no question about it that high-pressure gas lighting is playing a valuable part in the gas industry, and is destined to play a still larger part in shaping its destiny. This branch of business is a very live one at the present time; and, therefore, there is no occasion for any apology for keeping readers absolutely up to date as to what is happening.

PARADE LIGHTING.

If gas authorities have been unsuccessful in getting installed high-pressure lamps for main street lighting, there is a branch in connection with such lighting—a lucrative branch and a helpful one in maintaining prestige—that can be immediately taken in hand and developed. It forms, as our American friends would call it, a good business proposition, and has already been classified and named "parade lighting."

Apart from the public lighting developments, one cannot avoid, in travelling in and about London, being struck by the growing frequency of examples of high-pressure lighting. On investigation, it is found that most of the London and Suburban Gas Companies are now prepared to instal gas-compressing plants in any situation where there is a reasonable prospect of the tradesmen availing themselves of the advantages—primarily the one of raising the attractions of the neighbourhood of their business premises—of high-pressure lighting. Most tradesmen go in for some form of outside lighting; and in the high-pressure system, there is the ready means of vastly improving the lighting, and of increasing the magnetic influences of a good shopping centre. We believe in the main arteries of cities and towns being well, but not extravagantly, illuminated. At the same time we have great sympathy for the tradesmen carrying on their businesses away from the main streets who complain that, as ratepayers, they must contribute to the expense of adding to the attractions of the neighbourhood in which are the establishments of their more favoured and opulent competitors, who have already the advantages of situation, influence, and purse on their side. This complaint would not have the same weight, if the lighting of the main streets at the ratepayers' expense were kept at a reasonable level, and the tradesmen located there were to themselves pay for any extra illumination they required immediately in front of their premises. Parade lighting by high-pressure gas-lamps is the very thing they want.

We are under the impression that Mr. A. E. Broadberry, Engineer and Manager of the Tottenham and Edmonton Gas Company, initiated the idea of the business that comes under the designation of parade lighting, under which rows of tradesmen's premises are illuminated outside by high-pressure gas-lamps at a fixed scale rate per annum for an arranged number of lighting hours. At the present time, within the Tottenham Company's area of supply, there are approaching 600 lamps outside business premises supplied from gas-compressing plants on the plan of fixed terms; and these lamps are of the Keith inverted type, and are almost without exception of the 600-candle power size. It is manifestly a popular system; and shopkeepers are infinitely better pleased with the lamps and the results than they are with the flickering and glaring flame-arc lamp, which is dependent for the continuity of its service on all being well from generating plant to the light-giving source. Tradesmen have so frequently experienced trouble from the *bizarre* conduct of electric lighting that they are learning more and more to appreciate that which is absolutely reliable in the matter of illumination, and does not play them false at inconvenient seasons.

There is one point in connection with this question of parade lighting by high-pressure lamps supplied on a fixed tariff about which gas undertakings who have not yet entered into the business will be glad of information from actual experience, and that is the question of mantle maintenance. We know that our electrical friends, when they attempt to compete with high-pressure gas-lamps, present very imaginative figures as to the number of mantles required for renewals per lamp per annum. Under this parade lighting system, the number of mantles required is not a matter that need in the slightest concern the tradesman. But Mr. Broadberry has kindly consented to the publication of the following table, showing the actual mantle maintenance, during the winter quarter, January to March last, for the lamps then in use in this branch of business; and from the figures it will be seen that mantle maintenance is by no means excessive:

Parade Lighting in the Tottenham and Edmonton Company's Area.
Mantle Maintenance during the Quarter ending March 10, 1910.

Station.	No. of Lamps.	No. of Mantles.	Average Per Lamp.
Lower Wood Green	207	292	1·4
Upper Wood Green	33	96	2·9
Middle Wood Green	23	53	2·3
Myddelton Road	46	77	1·6
Harringay	74	94	1 2

The system of parade lighting has commended itself to many gas undertakings; and it is seen from the information available that shopkeepers are responding freely with their favour to the opportunity afforded them. In London there are already several hundreds of lamps installed on the system. The Gaslight and Coke Company have many installations, some of them exceeding a hundred lamps each. The South Metropolitan Gas Company are also exploiting the system; and there has likewise been successful work in the same direction by the Brentford, North Middlesex, Hornsey, Croydon, Wandsworth and Putney, Ilford, Ipswich, Tunbridge, and other Gas Companies. And it is safe to say that these Companies would not now be without this powerful aid to maintaining the shop lighting business. Half a loaf is better than none; and if the outside lighting of a shop can be retained (should the shopkeeper prefer electricity inside), it is better than not having any of the custom of the premises. It frequently happens that, when the outside lighting gives increased satisfaction, if gas lighting is used inside, the tradesman has a desire that it shall also be improved; or if electric lighting is there, it is often evicted—if not at once, then later; and to this end collapses of the electricity supply serve as effective promptings. Already, the James Keith and Blackman Company inform us they have supplied

upwards of 2000 high-pressure inverted lamps for application on this system; and gas companies who have entered into the business report parade lighting on fixed terms per annum as an inestimable means of meeting the competition of flame-arc lamps.

Railway Station Lighting.

The use of high-pressure gas-lamps for the lighting of factories, works, markets, and so forth has been often alluded to in our columns; but railway stations are excellent public places in which to get such lighting installed. As allusions in the "Journal" have previously informed readers, a large gas compressing and lighting plant has evicted the electric light from the Brighton Station goods-sheds, yards, and sidings, of the L., B., and S.C. Railway. The evidence that this plant must have given the management of the Company every satisfaction (we know as a matter of fact that it has been working perfectly without a single hitch) is found in the fact that the Company have lately placed with the Keith and Blackman Company an order for a large high-pressure lighting plant for their new Lancing carriage works. It will consist of a compressing plant, capable of dealing comfortably with 10,000 cubic feet of gas an hour, with the necessary number of lamps to fill the requirements of the shops at present erected, which represent about a fourth part of the total scheme. The Company have likewise given an order for plant for the lighting of their engine-sheds and goods yards at Eastbourne. Such confidence and satisfaction as these new orders express must be very gratifying to the contractors. The lighting of the railway station or stations in the district of a gas undertaking by high-pressure plant is a business well worth trying to secure, as being commercially advantageous from every point of view.

City Street Lighting and Central Suspension.

Turning from the lighting of business premises and railway stations to the public illumination of the streets, there are two or three pieces of information as to what is being done to meet the views of local authorities in connection with the use of high-pressure gas-lamps. In the first place, it will be remembered the deputation from the City Corporation who visited the Continent to investigate the street-lighting methods there returned enamoured of the high-pressure inverted gas-lamp, and of central suspension, with raising and lowering gear, so that the lamps can be cleaned and "trimmed" from the street level without impeding the road traffic. The electricians were angered over the preference for the high-pressure inverted gas-lamp; but they found an unholy joy in the imagined impracticability of having central suspension of the lamps, raising and lowering gear, and maintenance at ground level. Their joy was short-lived. They have seen lamps on columns with raising and lowering gear at Blackfriars Bridge Approach; and news has floated to them from abroad that there are examples to be found on the Continent of lamps so treated. The central suspension of such lamps, with travelling and raising and lowering gear, forms part of the experiment that is shortly to be made in the City. The venue of the trial is to be from the island opposite the west side of Cannon Street Station to the last island by King William Street. The trial installation will include two column inverted gas-lamps of the Keith pattern and of 1500-candle power each, and seven centrally suspended lamps of 2000-candle power each. The suspension gear will be fixed at a height of 30 feet; the lamp itself being slightly over 25 feet from the road level. The lowering tackle is to be so contrived that the lamps can be drawn to the side of the street, and lowered so as to be attended to from the pavement; or, as a matter of fact, at any point between the supporting wall and the centre of the roadway. There will be a special safety catch on the running support for each lamp; so that, when the lamp has been fixed in position, all strain will be taken off the wire ropes. The winches, which have double drums, will be fixed in convenient positions on the side walls of the buildings, some within reach of the pavement, and others at *facia* height, in which case short ladders will be used to operate them. But all maintenance work will be done at the ground level.

This, of course, is rather an important experiment, because only odd lamps here and there have hitherto been fixed with raising and lowering devices, which necessitate flexible tubing. It will be interesting to see how the cost of maintenance of the apparatus will run out; and on this head the trial will give an opportunity of learning something as to the best system to adopt, and the best form of construction for the metallic tubing.

The West-end High-Pressure Lighting Contract.

The success of high-pressure gas lighting in ousting electricity from the very heart of the West-end is still fresh in memory; and full details surrounding the matter have been published. But there are one or two fresh points of some interest concerning the actual carrying out of the contract that may be placed on record. In the "Journal" for June 14 (p. 691), we illustrated a pattern of the new Keith lamp of high-candle power, and that is the one that has been selected for use in the West-end. The trial lamps fixed in Aldwych (two of column type and four of the suspended type) have resulted in the column type being chosen for the whole of the high-pressure lighting included in the contract secured by the Gaslight and Coke Company in the district of the Westminster City Council. The only alteration from the lamp as illustrated on June 14 is that the reflector is to be perfectly flat. It will be remembered that, in Mr. Abady's paper before the Institution of Gas Engineers, he reproduced some clauses from the contract; and one of them provides that the reflectors are to be "horizontally flat or slightly convex or otherwise as may be approved by the City Engineer, so as to disperse the rays." Choice has fallen on the horizontally flat reflector. To meet immediate requirements, twenty three-burner lamps, giving a maximum of 4500-candle power each, and 172 of the two-burner lamps, giving a maximum of 3000-candle power, have now been ordered.

With all this expansion in high-pressure lighting, business high-pressure is being felt by the James Keith and Blackman Company. In order to properly handle the glass and enamels only, they have had to take possession of a warehouse with a superficial area of some 15,000 square feet; and it is hoped that this will enable them to meet the season's trade without experiencing any undue delays. The position of the high-pressure lighting business, mainly through the new developments, is extremely interesting.

AMERICAN PRODUCER GAS PRACTICE.*

For a general treatise on modern producer gas practice, including gas testing, the preheating of air, and other incidental matters connected with this rapidly growing industry, it would be difficult to find a better work than this. The author has taken special precautions, he says, to "maintain an impartial attitude and to narrate as accurately as possible, without prejudice or undue influence, the various features of producer gas engineering at present in vogue in the industrial field," and he has succeeded well in his endeavour.

The work consists of twenty-two chapters and an appendix, and is copiously illustrated. The general construction of gas producers is first described; special attention being paid to the effect of steam on the fuel and on the heating power of gas itself. Then follows a chapter on cleaning the gas, so that it may be used in engines; and then there is a particularly interesting chapter, entitled "Works Details," which deals with vaporizers, charging appliances, insurance requirements, and right treatment during asphyxiation.

The chapter devoted to types of producers is good so far as it goes; but the number of types described is somewhat limited. It includes a number of producers never seen in Great Britain; while several of those best known in this country, and in Europe generally, are omitted. A chapter on fans and others on the physical and chemical properties of gases contain several valuable tables, and should prove useful for reference.

Various automatic appliances for gas analysis are described—including the "Uehlung Composimeter," the "Sarco Recorder," and the "Wise CO_2 Indicator." But the fact that the determination of carbonic acid without the carbonic oxide is useless, does not appear to be mentioned.

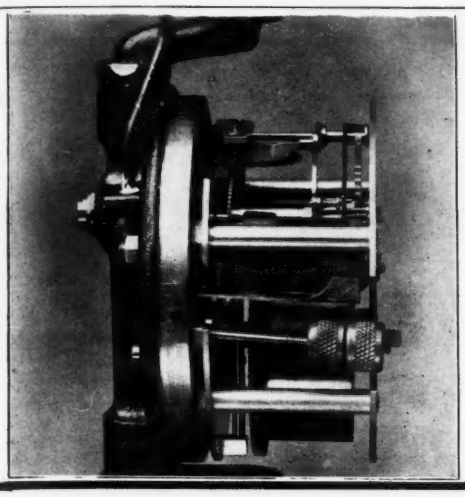
The subject of gas for power in engines is treated rather superficially, as is also that of the application of producer gas in various industries; but the treatment is amply full enough for the general reader interested in producer gas. The same is true as to the chapter on furnaces and kilns; the types chosen being by no means the best for this purpose, with the possible exception of the Schmatolla high temperature kiln. Curiously enough, no mention is made of Mr. Schmatolla's lime kiln—though one is illustrated under the indefinite title of a "German Kiln." Yet this is the one for which he is best known and on which his reputation, both in Europe and in the States, has been founded.

The chapters on preheating, on combustion in furnaces, temperature, radiation, conduction, pyrometry, and calorimetry are good; but the appliances for reversing the gas currents in the regenerators would be considered primitive in this country, and the author does not appear to be well acquainted with Seger cones.

The volume contains an abundance of tables and diagrams on a great variety of subjects, a short glossary of technical terms, and an appendix on oil-gas producers. The index is copious and well selected; and the illustrations are exceptionally clear.

* "American Producer Gas Practice." By Nisbet Latta. London Crosby Lockwood and Son; 1910. [25s. net.]

Prevention of Gas and Water Accumulations in Electric Junction Boxes.—Mr. A. Champion, an assistant in the electrical and highways branch of the Chief Engineer's department of the London County Council, applied, under the Standing Orders, for permission to obtain full patent rights in respect of an invention in connection with the construction of electric junction-boxes and similar chambers for the prevention of gas and water accumulation therein. The Chief Engineer reported that the work on which Mr. Champion was engaged had brought prominently to his notice the desirability for some arrangement to prevent such accumulation, but that by his official position he had not directly enjoyed any facilities for originating, working out, and perfecting his invention. At the meeting of the Council last Tuesday, it was decided, on the recommendation of the General Purposes Committee, that Mr. Champion should be permitted to obtain full patent rights in respect of his invention, subject to the condition that the Council be allowed to use the patent without payment, should they so desire.



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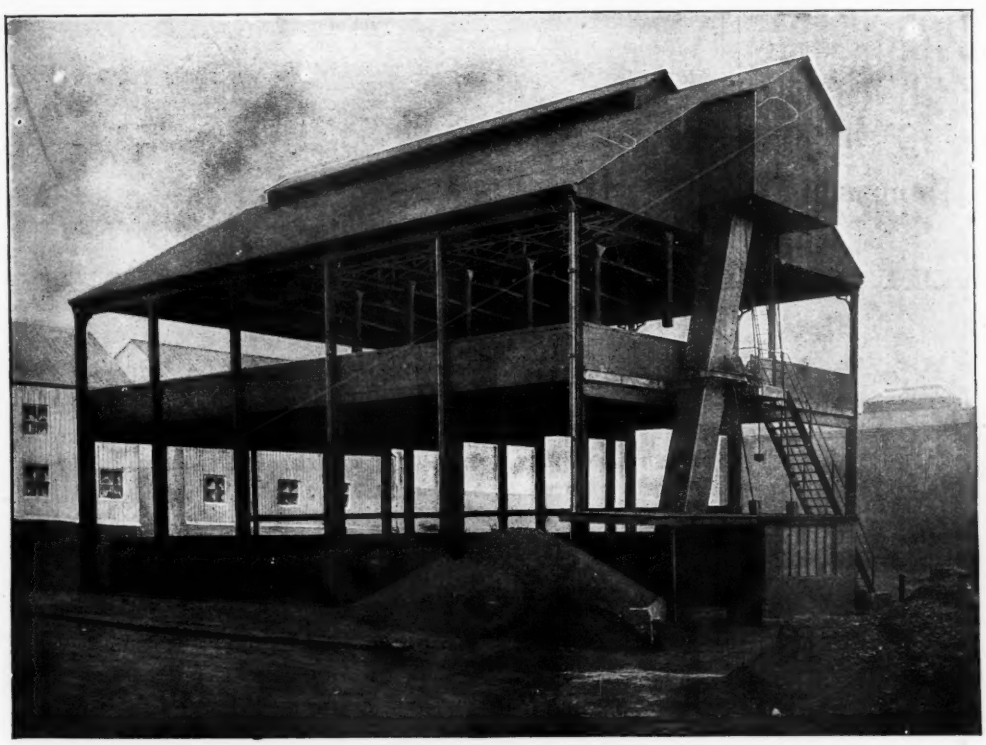

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EXAMINATIONS IN "GAS SUPPLY"—THIRD YEAR.

Answers to the Questions Set.

[FOURTH ARTICLE.]

5 (*a*). Give the equivalent of 54 inches of water pressure in pounds per square inch. (*b*) Define explosion, and state the explosive limits of coal gas and air. (*c*) What is the law of diffusion of gases?

The pressure of an average atmosphere is 34 feet of water, or 14·7 lbs. per square inch. Therefore, a pressure of 54 inches is

$$\frac{4{\cdot}5 \times 14{\cdot}7}{34} = 1{\cdot}945 \text{ lbs. per square inch.}$$

(*b*) Explosion is a bursting with violence and loud report due to the sudden expansion of an elastic fluid. It may also be looked upon as an intensely rapid chemical action, giving rise to gases or vapours which, being greatly expanded at the moment they are formed by the heat developed during the action, occupy an enormously larger volume than the original substance. The limits of explosion are: The gas must not get less in proportion to air than 1 to 13, nor greater than 1 to 5. Varying compositions of gases slightly affect these figures.

(*c*) The relative velocities of diffusion of any two gases are inversely as the square roots of their densities.

---

6 (*a*) How may the variations of flame temperature be measured? (*b*) State briefly a method of estimating radiant energy sensible as heat from a gas-fire; (*c*) Why is a highly aërated bunsen flame hotter than a less aërated one?

(*a*) Flame temperature may be measured by a thermo-couple, as described by Professor Smithells (fig. 6). This consists of two wires of different metals in contact. Its utility depends on the fact that when the point of contact is heated, an electromotive force is developed, the intensity of which is definitely related to the temperature of the junction. Suitable metals are platinum and palladium. The free ends of the wires are connected with a galvanometer which has been standardized by known temperature. By inserting the couple in the flame, the deflections, and consequently the temperatures and changes of temperatures, can be noted. The sketch shows the couple in the flame.

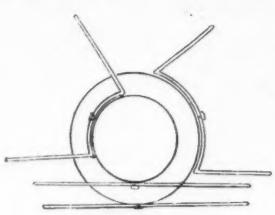


Fig. 6.

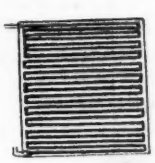


Fig. 7.

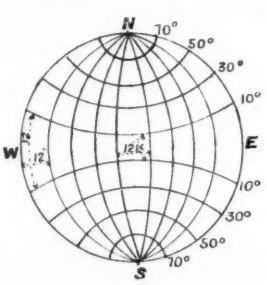


Fig. 8.

(*b*) A method of estimating radiant energy sensible as heat is described in the report of the Gas-Heating Research Committee, 1909. The radiant heat emitted from a gas-fire is represented as falling on the inner surface of a hemisphere, and the method aims at measuring the radiant energy falling on this hemisphere. Professor Smith's radiometer (fig. 7) was used, consisting of a coil of flattened copper tube 12 inches square, through which a current of water is caused to flow at an even rate. Thermometers at the inlet and outlet are inserted to ascertain the change of the temperature of the water. The weight of water passed through in a given time being known, the quantity of heat in calories can be ascertained. Fig. 8 shows how the hemisphere was divided—viz., 81 areas, the relation of the areas between 10 deg. south and 10 deg. north are to the areas between 10 deg. south and 30 deg. south, or 10 deg. north and 30 deg. north, as 1 : ·94; to areas between 30 deg. south and 50 deg. south, and 30 deg. north and 50 deg. north as 1 : ·766; to areas between 50 deg. south and 70 deg. south, and 50 deg. north and 70 deg. north as 1 : ·5; and to areas between 70 deg. south and 90 deg. south, and 70 deg. north and 90 deg. north as 1 : ·174.

Readings are taken at each of the 81 spaces by a thermopile and galvanometer. The readings for each nine spaces between each 20 deg. latitude are totalled up and multiplied by its factor, as above stated. These are totalled for the 81 spaces and divided by the reading taken in the centre area; the result being called the "factor for radiometer value."

For example: Total readings . . . 200

Centre ,, . . . 7

Factor for radiometer value . . . 28·5

The energy radiated on the centre square has been ascertained by the radiometer. Suppose it is 29 calories, then the total energy radiated as heat = 29 × 28·5 = 826·5 calories.

Gas consumption per hour = 20 cubic feet.

Net calorific value of gas = 141 calories.

Therefore total calories produced per hour = 2820.

Therefore percentage of energy radiated as heat $= \frac{826{\cdot}5 \times 100}{2820} = 29{\cdot}3$ per cent.

(*c*) A given volume of gas gives out the same amount of heat, no matter how it is burned.

A bunsen flame obtains a certain portion of its air for combustion primarily by the holes provided near the gas-nipple for the purpose. This may be increased at will, and as the total amount of air required for complete combustion is practically a constant, it follows that if the primary supply of air is varied, so will be the secondary.

Starting with a slightly luminous flame in an ordinary bunsen, it will be observed that the flame is long and unsteady. The primary air supply being increased the flame shortens and becomes firmer till, with high aëration, a short, firm, and fierce flame is obtained.

The gas consumption is constant. The explanation of the variable condition of the flame is that, owing to excess primary air, the flame has not to travel so far to obtain the necessary amount of oxygen for complete combustion.

---

7. A 10 H.P. gas-engine requires overhauling. Describe in detail the operation of taking off, repairing, and replacing the valve box, gas, air and exhaust valves, piston, and connecting rod. Why should a suction-gas engine have an auxiliary supply of town gas?

First unscrew the nuts holding the valve-box in position, and lift it off. Then take out the cotter-pins from the ends of the valve spindles; thus releasing the nuts and washers and allowing the springs to be taken off. Then the valve spindles can be withdrawn through the inside, and the valve-box cleared of all carbonized gas, dust, and corrosion. Fix the valve-box in such a position that when the valve spindles are in they point downwards. Put in one spindle, first powdering the seat with finely-ground emery. Then a brace with a screwdriver bit is put into the top of the valve spindle and rotated with a little pressure, to grind the valve into its seating. The grinding must be continued until every part of the valve and seating is bright, showing that the valve touches its seating all round. This process is repeated with the other two valves. When the spindles are in their respective positions, the springs, washers, nuts, and cotters, can be replaced.

Now unscrew the locknuts on the crank end of the connecting rod, and take off the sheave. If the piston is on the inner dead-centre, rotate the fly-wheel half-a-revolution in order to release the connecting rod. The connecting rod and piston are withdrawn together. The piston rings can then be sprung off, and the piston end, piston, rings, and cylinder cleaned. If any of the rings have become worn and slack fitting, or have lost their resilience, they should be replaced by new ones. In putting on the rings, care must be taken to see that all the openings where the rings are split are not in the same straight line, but alternately round the piston. The piston is then put into the cylinder, and the fast sheave of the connecting rod pushed on to the crank-pin. The loose sheave is placed over the bolts in the fast one, and the locknuts screwed up. The valve box can then be replaced, putting in new asbestos packing to make a tight joint, and the nuts screwed up.

It is desirable to have an auxiliary supply of coal gas to start the engine, and also in readiness for any breakdown in the suction plant, or for shortage of fuel.

---

8. The drawings are (fig. 9) a front elevation, (fig. 10) a plan, and (fig. 11) an enlarged section of the parapet which surmounts a railway bridge. Show by sketches in plan and section how you would carry an 8-inch main from point C in the highway to point D and support it to the wall on side E of parapet. State, with reasons, what class of main you would employ, how expansion and contraction would be provided for, what specials would be necessary, and what tools and other materials would be required to complete the work.

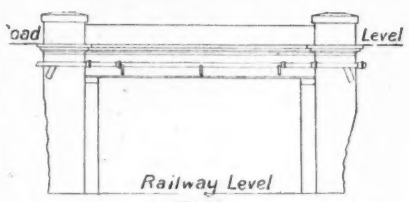


Fig. 9.

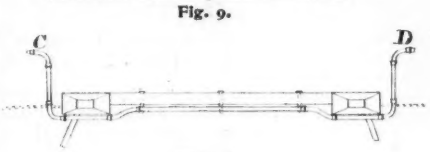


Fig. 10.

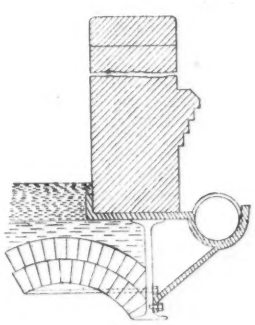


Fig. 11.

Steel, such as Mannesmann weldless, is the best type of main to be adopted. The necessity of selecting a class of main which is not too heavy is obvious, as it has to be suspended on brackets attached to the brickwork of the bridge. Being lighter, such mains are more easily placed into position than cast iron. Steel mains are not as susceptible to changes of atmospherical conditions as cast iron. As the main is constructed partly of bends, and is less than 40 feet span, any special provision for expansion or contraction is unnecessary.

The specials required would be:

Two 8-inch double S bends,

Four 8-inch ¼ bends. Also suitable short pieces.

The tools and materials required are: Three brackets, as shown in figs. 9 and 10. The end of the main may be let into the buttress walls; or if the walls are not quite high enough, built up to suit. Alternatively, special brackets of flat steel may be used, and secured to the brickwork with rag or Lewis bolts. It will be preferable to make the joints with lead wool. Other materials required are: Lead, yarn, yarning iron, setts, tools for excavating, chisels, hammers, set-screws, and scaffolding, with

suitable arrangement for suspending from top of parapet wall.

---

9 (A). Give diagram showing the candle power at different angles below the horizontal of (*a*) any inverted burner, and (*b*) any upturned burner, each working at ordinary (say, 2 inches) pressure, and consuming not more than 4 cubic feet of gas per hour. A simple sketch in sectional elevation of each burner must also be given.

9 (B). State generally how you would carry out lighting installations for any two of the following, having regard to the effect of artificial light on the eyesight: (*a*) Dining-room, (*b*) brass finisher's workshop, (*c*) draper's shop window. What type of burners and globes or shades (if any) would you adopt in each case, and why?

Dining-Room.—In a dining-room, light is chiefly required for (1) Illuminating the table during meals; and (2), sewing or reading at other times. In the first case, the occupants sit round the table [usually in the centre of the room]; and in the second case, they most frequently sit facing the fire-range. It is not possible with exposed light sources to illuminate for both conditions satisfactorily, and even with shaded sources some compromise is necessary. This is best effected by fixing at about the centre of the room a movable pendant, so shaded as to prevent the light sources from being in the range of vision of any occupants of the table. The movable pendant may be advantageously supplemented with two brackets or else figures fixed above the mantelpiece. The latter, however, should be extinguished when the people are sitting round the fire.

Inverted burners of approved type should be employed, and should be fitted with suitable adjusters. The number of units will depend upon the size of the room.

A very soothing effect is obtained with silk shades formed of white interior and green exterior. For ordinary use, it is undesirable to use shades, which obscure a large portion of the light. Most satisfactory results are obtained from white satin-finished globes. If, however, more toning down is required, green etched globes would be preferable.

Brass Finisher's Workshop.—For a large establishment, an installation of high-pressure gas would best meet the requirements. A Keith rotary compressor may be used and inverted burners; a row of these being fixed down the centre of the shop. For the special use of the workmen, some smaller units fixed on movable brackets and flexible tube may be utilized. The lights should be fixed in close proximity to the point required by the workmen, but kept clear of the machines; so that the mantles will not suffer through vibration.

As an alternative scheme, and not quite as expensive in first cost as a high-pressure installation, a row of (say) 4-light inverted lamps may be fixed down the centre of the shop. These should be fitted with clear bowls. Inverted burners with green enamel shades should be fixed on movable brackets near the machines for the use of the workmen.

Anti-vibrators may be used in each case if vibration is considerable.

Draper's Shop Window.—This may be carried out either by exterior or interior lighting, or a combination of the two. If the lighting can be completely done from outside, it is to be preferred. There is no risk of fire, and no dazzling light units to attract the attention of prospective customers. It must never be forgotten that shop lighting is solely a method of attracting attention to the displayed goods.

The number of outside lamps would depend upon the length and the nature of the window. Each lamp, generally speaking, should have globes clear on the window side and obscured on the street side. The height of the globes must be such as to accord with the bye-laws of the local authority.

Where outside lighting is not adaptable, the display window should, if possible, be encased, and a number of lights placed above the casement with suitable reflectors for downward illumination. Either vertical or inverted burners can be excellently adapted to this end.

Where the window is wide from front to back, it may be necessary to fix one or two light units in the window; but the dressing should be so arranged as to conceal these from the eyes of the people outside. The best examples of shop lighting are those in which, no matter whether the window is small or large, no light source is visible to the looker-on.

---

10 (A). What quantity by volume of carbonic acid, and what weight of water is produced by the combustion of 1000 cubic feet of average coal gas? What volume per hour of carbonic acid, and what weight per hour of water, is given off by the respiration of an adult under normal conditions; and how many British thermal units of heat does he give out? In what ways, respectively, do the products of coal gas, and the respiration of human beings affect the atmosphere of rooms?

1000 cubic feet of coal gas produce on combustion 600 cubic feet of carbon dioxide and 42·1 lbs. of water.

An average adult gives off 0·8 cubic foot of carbon dioxide per hour.

An average adult gives off 0·1 lb. of water per hour.

An average adult gives off 440 B.Th.U. per hour.

The products of combustion from a gas-flame materially increase the temperature of the air of a room, seeing that each cubic foot of gas will yield from 500 to 600 B.Th.U., and each unit will heat 1 lb. of air 4° Fahr.

Each cubic foot of gas burned yields 295 grains of water, which will prevent the heat having a drying effect on the air.

For every cubic foot of gas burned, about 5½ cubic feet of air are used, or approximately 4·345 cubic feet of nitrogen and 1·155 cubic feet of oxygen; the resultant products being carbon dioxide, water, and nitrogen. The gas, therefore, extracts a certain quantity of oxygen for combustion; but the heat generated induces a constant change of atmosphere in the room through ventilators and other openings.

The products of respiration also impart heat, moisture, and carbon dioxide to the atmosphere. The heat produced from a person per hour is equal to about 0·625 cubic foot of gas burned; further, each person (adult) will require about 1 cubic foot of oxygen, or the oxygen contained in 4·8 cubic feet of air. Organic matter is also exhaled in small quantities from the lungs and pores; and this has a very deleterious effect upon the hygienic state of air.

---

10 (B). Compare the relative fire risks of (*a*) town gas, (*b*) petrol air gas, (*c*) acetylene, (*d*) oil-lamps, and (*e*) electricity. State what you know of the general effect of each upon insurance rates.

(*a*) Fires are chiefly due to leaky joints, corroded pipes, or burners placed too near ceilings, partitions, curtains or similar easily-ignited objects. The characteristic smell of coal gas renders leakage easily traceable. Where any adjacent objects are ignited by burners, it is attributable to careless workmanship.

(*b*) The risks attendant upon petrol-air gas depend chiefly upon the construction of the generator and the percentage of petrol vapour in the mixture. A 2 per cent. mixture of vapour with 98 per cent. of air, if ignited in a confined space, will produce a sharp explosion. The greater the specific gravity of petrol, the lower percentage required to give the maximum explosive mixture. The proportions given are in the neighbourhood of those adopted in many air-gas systems. The fire risks depend chiefly on the nature of the constructional safeguards against lights coming into contact with the vaporized air in any enclosing vessels forming part of the plant. Elaborate means, therefore, are taken in the construction of burners by the use of gauzes, fine tubes, shot, &c., to avoid flashing-back. If an air-gas plant is designed to work with a greater mixture than 6 per cent. of petrol vapour, the risks of explosion are slight, providing adequate means are taken to keep up the percentage of vapour when an increased demand is made on the plant.

(*c*) The safety or otherwise of acetylene is, like petrol air, determined by the immunity or otherwise of the plant from explosion. In the early days, accidents were numerous; but the generators which have survived are much safer now than most of the earlier types. There is little risk of explosion, providing excessive pressure is avoided in the generator and in the supply pipes, and providing also that there is no leakage from fittings. Explosion and subsequent fire may ensue if burners are lighted before the pipes are emptied of air. The same precautions in placing burners, &c., are necessary as with coal gas.

(*d*) Although more stringent regulations are in force now as to the flash-point of the oils used in lamps, accidents continue numerous. The portability of an oil-lamp, and consequent frequent neglect to ensure its being placed in a safe position, is the most fruitful source of fires. Lamps are knocked over, and fire as well as explosions, frequently ensue. The heat of the lamp may vapourize the oil, and explosion ensue through the wick fitting tightly.

(*e*) The dangers of fire ensuing from electrical installations is now more generally recognized than formerly, with the consequence that stringent rules governing the work done are enforced by the Insurance companies. The well-known Phœnix Fire Office rules owe their origin to the numerous fires which have from time to time ensued through bad workmanship. The chief source of fires is the fusing of wires, owing to overloading or short-circuiting; electrical fusion or fire from escaping current being the result. Another danger source has now to be added—viz., that of filament lamps bursting, and the heated products of fusion setting fire to inflammable materials. As distinguished from gas, there is no indication of an escape of electricity until fire actually ensues. In the former case, the pungent odour usually leads to location of leakage, and fires bear a small relation to escapes.

Insurance companies class the fire risks in the following order: (1), electricity; (2), town gas; (3), acetylene; (4), petrol; (5), oil. Such companies consider oil to be far the most hazardous. Although electricity is still considered slightly safer than gas, it is a singular fact that gas-works insurance is usually 2s. per cent., and electricity works 3s. per cent.

Insurance companies insist upon acetylene and petrol-air gas plants being fixed in a separate building from that they are intended to illuminate.

The premium for workmen's accident insurance in electricity works is about 2s. 6d. per cent. more than for gas-works.

Mond Ammonia-Recovery Plant.

The Power-Gas Corporation, Limited, have recently secured an order for a large Mond ammonia-recovery plant for the Birchenwood Colliery Company, Limited, of Kidsgrove, near Stoke-on-Trent. It is to produce gas for boiler firing and power from a mixture of bituminous slack, washery refuse, and belt pickings. It is equivalent to 32,000 H.P. in size, will gasify 320 tons of the fuel per 24 hours, and will comprise 13 special Mond producers, fitted with arrangements for the mechanical removal of the ash, of which about 40 per cent. will be contained in the fuel to be gasified. The whole plant is to be erected complete and started to work in nine months, and when finished will be one of the largest producer-gas units in the world. The installation should be of particular interest to colliery companies, since it opens up the possibility of using materials which are at present of no value, and are frequently a source of trouble owing to the offensive odours given off. It also possesses the advantage that the revenue from the sale of the sulphate of ammonia produced will in a short time repay the initial cost, after which the installation will be a source of profit. Mond-gas producers are already at work in several other collieries, successfully gasifying waste shale as well as many varieties of caking coal which have previously been found unsuitable for gas production.

The marriage was solemnized last Tuesday of Mr. Laurence W. Simpson Rostron and Miss Kathleen Mary Dingwall, eldest daughter of Sir Arthur Dingwall, of Shipley House, Carshalton. Mr. Rostron is the eldest son of the late Mr. Simpson Rostron and Mrs. Rostron, of Riverside, Beddington, Surrey.

PARLIAMENTARY MUNICIPAL TRADING RETURN.

THE final stage is now reached in the publication of the return with reference to municipal trading in the United Kindom which, as readers already well know, has been prepared at the instance of Mr. L. G. Chiozza Money, who, during the last Parliament, was the member for North Paddington. This return, owing to the tremendous amount of ground covered by it, had to be divided into a series of volumes, the issue of which has been taking place one by one at more or less regular intervals. It is over a twelvemonth since Part I. was published; and a fortnight since the sixth (and last) volume made its appearance—three-and-a-half years after the return was moved for in the House. Parts I. and VI. were noticed in the "JOURNAL" for June 22, 1909; Part II., on Sept. 21; and Part III., on Dec. 28. Part IV. was similarly dealt with in our issue of March 29; and now we have before us Part V. —which, as indicated, is the sixth to be published, owing to one of the parts having appeared out of its numerical order. The expense entailed in the preparation of these volumes must have been enormous; and exactly what object they are intended to serve, is somewhat difficult to understand. By the time of their issue, too, the information contained in them had become hopelessly out of date. But possibly the instigator of the return would argue that this was of secondary importance, as the collected information for one year would suit his purpose as well as that for another. At any rate, in view of the labour and money bestowed upon them, we must hope that the complete figures, now they are at disposal—even though they may be so utterly out of date—will prove of some real utility, in spite of the fact that we ourselves do happen to be unable to see how any usefulness they may possess can be sufficient to justify their preparation.

Before dealing with the figures in the present volume, it may be well once more to briefly explain that the object of the return was to set forth certain trading statistics for the London County Council, the Corporation of the City of London, the Council of each Metropolitan Borough, the Corporations of the Municipal Boroughs of Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, West Ham, Newcastle-upon-Tyne, Kingston-upon-Hull, Nottingham, Salford, Leicester, Portsmouth, Bolton, Cardiff, Sunderland, Oldham, Croydon, Blackburn, Brighton, Derby, Preston, Norwich, Birkenhead, Gateshead, Plymouth, Halifax, Southampton, South Shields, Burnley, East Ham, Huddersfield, Swansea, Wolverhampton, Stockport, Middlesbrough, Stockton, and Blackpool, and the Edinburgh, Glasgow, Dundee, and Aberdeen Corporations. It was to indicate the nature and extent and, for each of the last four years for which figures were available, the financial results of reproductive municipal undertakings, including for each undertaking separately "a short description thereof, date and terms of original acquisition or establishment or subsequent extension, how managed, capital employed and how obtained, value of the undertaking, capital paid off and outstanding, loan charges, provision for depreciation, gross income and expenditure, net profit or loss, how profit is allocated or loss met, amount of relief or burden to rates, number and salaries of the chief paid officials, number of workpeople, rate of wages paid in chief classes of labour, and prices charged for products or services supplied or rendered." In a memorandum attached to the return, it is pointed out that the municipal boroughs in England and Wales mentioned above are all those which at the date of the Census of 1901 had a population of upwards of 90,000—with the addition of two (Stockton-on-Tees and Blackpool) which have a smaller population. When noticing Part I., some particulars were given with regard to the form in which the information was asked for and has been supplied in the return.

The municipal boroughs included in the volume now under notice are: Bristol, Newcastle-upon-Tyne, Kingston-upon-Hull, Portsmouth, Cardiff, Sunderland, Gateshead, Plymouth, Southampton, South Shields, Swansea, Middlesbrough, and Stockton-on-Tees. With regard to these thirteen boroughs, the number of reproductive undertakings which fall to be included are respectively: Bristol six, Newcastle-upon-Tyne six, Kingston-upon-Hull nine, Portsmouth six, Cardiff five, Sunderland six, Gateshead three, Plymouth six, Southampton six, South Shields five, Swansea six, Middlesbrough seven, and Stockton-on-Tees six. In only three cases is gas supply included—those of Kingston-upon-Hull, Middlesbrough, and Stockton-on-Tees, but water figures in seven instances—Kingston-upon-Hull, Cardiff, Plymouth, Southampton, Swansea, Middlesbrough, and Stockton-on-Tees. With regard to Stockton-on-Tees water supply, it may be pointed out that up to March 31, 1906, the Town Council had borrowed £1,155,004 for the purposes of the undertaking carried on by the Tees Valley Water Board. The Council have not furnished in connection with the present return, particulars relating to their share in this undertaking. In twelve of the boroughs the electricity supply is a municipal one—the single exception being Gateshead. But in the case of Newcastle-on-Tyne, the statement needs some qualification. The Council do not, in fact, carry on an electric supply undertaking. They are, however, liable for the loan charges in respect of money raised for the purposes of such an undertaking (subsequently sold to a company) by an authority now superseded by the Council. In nine of the places there are tramways owned (though not in all cases worked) by the Council. In twelve instances markets appear; and in the same number of cases there are municipal baths. Seven of the boroughs have working-class dwellings; while among the more varied undertakings, one notices the following: Bristol, municipal lodging-house and docks; Newcastle-upon-Tyne, quay; Kingston-upon-Hull, harbour and dock and telephones; Portsmouth, harbour, quay, and wharf, and telephone exchange; Sunderland, ferries; Gateshead, quay and cemeteries; South Shields, quays; Swansea, telephones; Middlesbrough, ferry and wharf and cemeteries; and Stockton-on-Tees, quay.

During the four years referred to in the return—1902-3, 1903-4, 1904-5, and 1905-6—the Bristol rates received about £7000 from the markets. Newcastle-upon-Tyne has in the same way benefited from a like source to the extent of £21,000; and a sum of £300 has also been received from working-class dwellings. At Kingston-upon-Hull, the water-works contributed some £23,000, the tramways over £60,000, and the markets £1500. In a similar manner, Portsmouth benefited to the extent of £3500 from the electricity undertaking, £3500 from the tramways, and £17,500 from the harbour, quay, and wharf. At Cardiff, the electricity undertaking has handed over to the rates £6000, and the tramways £650. The Sunderland tramways undertaking contributed £12,500; and the Plymouth water-works £17,500, electricity supply £900, markets £3000, and baths £400. The Southampton water-works have handed over £1370 (all in the year 1902-3), the tramways £10,000, and the markets £1000. The South Shields electricity undertaking has handed over £1100, the tramways £700, the baths £3300, and the quay £1000. The Swansea rates benefited from profits on the markets to the extent of £9000; while Middlesbrough from this source received £1000, and from the ferry and wharf £6000. At Stockton-on-Tees profits from the gas-works have in the years referred to been handed over in relief of the rates to the extent of nearly £25,000; the markets having also contributed some £2000.

In these few figures, we have endeavoured to set out what appears to be the only point that can, without a great deal of trouble, be extracted from the 200 odd pages of tables, &c., of which the present volume is composed. The number of different undertakings carried on by various councils affords an indication of the extent to which municipal trading has grown; and as for the amounts given in relief of the rates—well, the enthusiastic champions of municipalization in every possible direction must be left to make what arguments they can out of them. This factor cannot, in any event, of itself decide the wisdom or otherwise of the policy of such trading; for the circumstances of each individual case need careful consideration. But even if one were inclined to justify municipal trading by the benefit which the rates receive from it, the figures in the volume before us would not be very helpful to this end. During the four years referred to in the return, it will be seen that, out of the 77 undertakings carried on by the thirteen boroughs, only 28 handed over sums in relief of the rates. The second largest contribution appears to the credit of one of the gas-works represented—Stockton-on-Tees. It will, of course, be admitted that many of the undertakings are not such as would in any case be carried on primarily, or even mainly, for purposes of profit; and perhaps in some other instances the method has been adopted of giving the whole of the benefits of municipal service to the particular customers of each separate undertaking.

A GERMAN TEXT-BOOK ON PRODUCER GAS.*

THE text-book before us is a new volume of the well-known series of chemical-technical manuals published by A. Hartleben, of Vienna and Leipzig. It essays to treat of the manufacture of producer gas, including all descriptions of power gas which are made in producers or generators, as distinct from gases made by carbonization processes. It also deals with the use of these gases for power and other purposes.

The treatment of the subject is divided into three parts, of which the first refers to producer gas itself. The first section of this part of the work is on the theory of heat, and gives the usual thermal and other constants of which a knowledge is essential to the proper comprehension of the theory of the process of gasification in producers and generators. The second section treats of this theory, and affords as good an explanation of it as we have yet seen compressed into comparatively small compass. There is here a printer's error; the name of Mr. Bone's collaborateur in his investigation on the "Direct Union of Carbon and Hydrogen" being given as Jesdan, instead of Jerdan. Later in the section, anthracite is spoken of along with ordinary coal and wood as yielding products of distillation on heating. It is accordingly distinguished from coke and charcoal as a generator fuel. But in practice anthracite as used in this country and America in producers or water-gas generators is more nearly allied to the latter fuels than to coal or wood. The third section refers to producer gas, which is here used as a comprehensive term for producer gas proper, semi-water gas, and water gas. Reference is made to the distinction between producers, according to whether they work with a positive or a negative pressure at the grate. The fourth section describes the chief characteristics of the fuels used in the manufacture of producer gas and water gas, including wood and

* "Das Generatorgas seine Erzeugund und Verwendung." Von Dr. Carl Kietaibl. Mit 151 Abbildungen. Vienna and Leipzig: A. Hartleben; 1910.

peat, which have of recent years come into the foreground for the production of power gas, and of a number of other products the manufacture of which may be regarded as the prime object of the processes carried out in the producer. Ammonia and other so-called bye-products are in reality the staple products of many of the so-called gas-producing processes which are carried out with peat, slack coal, or other poor fuels. This contention has frequently been put forward in our columns in the past; and some recent industrial developments show that it is being justified by the actual procedure. The gas produced is in some cases regarded as of so little value that a large proportion of it is blown away, while the plant is worked at a regular load for the sake of the continuous production of ammonia and other so-called bye-products. Brown coal and lignite naturally receive fairly full treatment in a text-book which is intended primarily for Austrian and German readers. For the same reason, also, English coals are less fully dealt with than German and Austrian, Anthracite, being, so far as Europe is concerned, obtainable only from South Wales, comes into consideration as a possible fuel for producers on the Continent only at sea ports, as elsewhere the freight charges would be prohibitive. The fifth section is on the analysis of solid fuels and the gas produced from them. All the ordinary forms of analytical apparatus are described; but the treatment given is not critical, and the reader will find it difficult to judge which methods the author has, from his own experience, found to be the preferable ones.

The second part of the book deals with producers and generators, the underlying principles of the construction of which are first referred to, together with the most suitable types of fans, blowers, air-lock feeding devices, tar-extractors, and other auxiliary apparatus of the generating plant. Then follow descriptions of different types of producers, commencing with those which work with natural draught, and following on to those in which the air is supplied at a positive pressure, and the suction producer. All the ordinary forms of these different types of producing plant are described and illustrated. Two special sections are devoted to the production of gas from bituminous fuel—one referring to producers which are adapted for the recovery of ammonia and other bye-products, and the other to producers in which the bye-products are ignored. The chief examples of the former type are, of course, the Mond and the Duff producers. The question of the fixation of atmospheric nitrogen by producer processes is next discussed. Then follows a section on water-gas generators, of which the Dellwik-Fleischer and the Strache types receive the fullest notice. The carburetted water-gas plants which are used in gas-works in this country are scarcely noticed; and the distinctive Kramer and Aarts type of water-gas generator is passed by with a comment that it essentially depends on the same principles as the other types, and presents no advantage over them. The last section of this part of the work treats of the working and control of the producers and generators. Speaking generally, the author has referred more or less fully to all existing types of gas-producer and simple water-gas generator of any note; and as a compendium of what is common technical knowledge in regard to them, this part of his work may be considered as a useful contribution to technology. His acquaintance with what has been done in connection with the production of power gas seems to extend to all countries and to quite recent times; but it does not appear that the information conveyed has been gleaned at first hand in most cases.

The third, and last, part of the manual deals with the use of producer gas and water gas. The first section refers to the employment of producer gas as a fuel; but there is no special description of the producer furnaces which are in general use on gas-works for heating retorts, though a brief allusion is made to the fact that producer gas is so used. The second section (which, by mistake, is numbered as the third) describes gas-engines, their working and general types, but is naturally too brief to be really of practical value to the user of such engines. The third, and final, section of this part is a short one referring to the use of producer gas as a raw material in certain chemical industries.

The book, which comprises 350 pages, closes with an all too brief index. As a compact and carefully compiled *résumé* of the present industrial position of the manufacture and use of producer-made power gas, we can confidently commend this little book to those readers of the "JOURNAL" who have sufficient knowledge of the German language to be able to peruse it.

Mr. W. Boyd Dawkins, a former Professor of Geology at the Manchester University, and well known in connection with water questions, has had the ordinary degree of Doctor of Science conferred upon him by the governing body of the University.

In a paragraph in a recent number of "Nature," reference was made to a "gas-calculator" designed by Dr. R. C. Farmer, a copy of which was sent to them by Messrs. Baird and Tatlock, Limited. The diagram consists of four vertical lines—the two on the left being graduated in temperatures for wet and dry gas respectively, and the line on the right graduated in pressures (millimetres). A celluloid strip bearing a black ruled line is laid across the observed pressure and temperature of the gas, and the corrected volume of 1 c.c. of gas is read off directly on the middle line. It is claimed to give the volume with an accuracy of 1 part in 5000 parts; and our contemporary has found it extremely rapid and convenient in use.

THE MUNICH CARBONIZING CHAMBERS.

An account was given by Herr H. Rauch, the Works Superintendent of the Municipal Gas-Works at Munich, to members of the Association of Gas and Water Engineers of Austria-Hungary at this year's meeting, held at Innsbruck on May 26 to 29 last, of the results of extended experience with the type of inclined carbonizing chamber which has become identified by name with the Munich Gas-Works. Herr Rauch's communication is published in a recent issue of the official organ of the Association—the "Zeitschrift des Vereines der Gas und Wasser Fachmänner in Oesterreich-Ungarn," from which the following abstract of his remarks has been prepared.

After preliminary trials on a small scale, the first bench of five settings of Munich carbonizing chambers was erected at the Kirchstein Gas-Works in Munich according to the plans and designs of Herr Ries, the Manager of the Munich gas undertaking, and was brought into action on Oct. 3, 1906. The five settings have been in continuous work, with short interruptions, up to the present time, and are still in a satisfactory condition. The side walls and roofs of the chambers are quite smooth and absolutely sound. The bottoms have required no repair in the four years, and offer no more obstacle to-day to the discharge of the coke than they did when they were first brought into use. The fourth setting, on which changes had been made as a result of the early experiences gained, has remained in action since June, 1907, with the exception of one interval of four weeks, during which it was equipped with arrangements for the admission of steam, but in which no repairs were carried out. The doors of the chambers are faced so that the joints throughout are iron to iron; and they have proved absolutely sound without the use of luting material. The only repair necessary has been the renewal of the fire protecting-screens on the discharging doors. The doors themselves have required no renewal or repairs.

As a result of the favourable experiences gained with these settings at the Kirchstein works, Herr Ries brought into action, in the spring of 1909, six settings having a productive capacity of 6000 cubic metres (212,000 cubic feet) per diem per unit, and in the winter 1909-10 six more similar settings, at the new gas-works on the Dachauerstrasse. At this works there are used nothing but the large chamber carbonizers. The experiences gained with these settings so far have been entirely satisfactory; and the author extended an invitation to those attending the meeting at Innsbruck to proceed to Munich to view the chambers in action. This invitation, it appears from a postscript, was accepted by Herr Anzböck, the Chief Inspector of the Imperial Continental Gas Association's works at Vienna, and Herr Arnold, the Superintendent of the Gaudenzdorf works at Vienna. That the fullest investigation is invited in regard to the working of these settings is, the author remarks, shown by the fact that 500 visitors from all parts of the world have inspected the settings at Kirchstein gas-works, and about 300 those at Dachauerstrasse works.

The author then proceeds to refer to the working results obtained with the settings. The figures throughout refer to carbonization without the use of steam, except where otherwise is specially indicated. Results obtained with the settings in the spring of 1907 were published by Professor Bunte,* and have been commented on by many authors subsequently; but the report of later investigations made by Dr. Drehschmidt, Chemist of the Berlin municipal gas undertaking, has been passed over by them.† Professor Bunte's figures compared favourably with earlier results obtained with retorts, but were considerably inferior to those secured when the settings were first brought into use. The settings were shifting apart in the direction of the axis of the chambers, for lack of proper transverse ties; and consequently there was considerable unsoundness. This was not surprising, having regard to the novelty of the construction. The cross-ties were then strengthened; and a few improvements were made in the heating arrangements. In July and August, 1907, the settings, in a sound condition, were subjected to fresh trials; and on the average of twenty days' working afforded a yield of 13,348 cubic feet of gas per ton of Saar coal, which corresponds with the make of gas originally obtained with the settings.

In the spring of 1908, these figures were confirmed by exhaustive investigations carried out by Dr. Drehschmidt, which were reported in detail at the time (*vide supra*). The chief results of the carbonization of a mixture of English and Silesian coal as found by Dr. Drehschmidt, were as follows: First trial, 12,175 cubic feet (uncorrected) per ton of coal; second trial, 12,340 cubic feet (calorific power 572 B.Th.U. gross per cubic foot); third trial, 12,566 cubic feet (554 B.Th.U.); fourth trial, 13,901 cubic feet (517 B.Th.U.). It will be observed that these figures show a gradual increase in make of gas, with a simultaneous diminution in calorific power, until, as the standard calorific power of 5000 calories per cubic metre (522¼ B.Th.U. gross per cubic foot) is approached, the make amounts to upwards of 13,900 cubic feet per ton of coal. This variation of yield and calorific power was secured solely by manipulating the heat of the settings. The average temperature, as measured at the burners and at the nozzles of the furnace, ranged from 2246° Fahr. with the make of

* See "JOURNAL," Vol. XCIX., p. 501. † *Ibid.*, Vol. CIII., p. 704.

12,175 cubic feet per ton, to 2340° Fahr. with the make of 13,901 cubic feet per ton; while the temperature of the chambers varied from 1807° to 1954° Fahr. respectively. When steam was admitted to the chambers, a make of gas of 14,568 cubic feet (uncorrected) per ton was secured; the gross calorific power of the gas being 510 B.Th.U. per cubic foot. Other figures obtained by Dr. Drehschmidt in his investigations show an average make of 13,148 cubic feet (uncorrected) per ton of coal; the gross calorific power of the gas averaging 553 B.Th.U. per cubic foot. A trial with Saar coal also gave the high make of 13,689 cubic feet per ton; the gas having a gross calorific power of 576 B.Th.U. per cubic foot. The calorific values were determined by means of a Junkers recording calorimeter.

The first bench of settings of large chambers at the Dachauerstrasse works gave in May, 1909, equally favourable results. A mixture of Saar and Karwiner coal afforded on the average a make of 13,320 cubic feet per ton. Exhaustive investigations have recently been made on the second bench of these settings. A four-days' run with Saar coal gave an average make per ton of 12,649 cubic feet; the gross calorific power of the gas being 602 B.Th.U. per cubic foot, and its specific gravity 0·459. Dr. Drehschmidt's investigations clearly showed that it was perfectly feasible to reduce this high calorific power by increasing the heats of the settings, and at the same time to obtain an increased make of gas. Up to the present, steam has not been used to lower the calorific value of the gas, except in a few experiments which showed that it was quite possible to work with the admission of steam in the chambers. The admission of steam is ordinarily carried out towards the end of the period of distillation—*i.e.*, at a time when the calorific power of the gas being evolved is at its lowest. The introduction of steam consequently reduces it still further, and at the same time increases the specific gravity of the gas through admixture of water gas. There is, therefore, a risk that when only one gasholder is used, the gas of higher specific gravity from the end of the charge will remain in the lower part of the gasholder and pass without admixture into the distributing system. The gas made towards the end of the distillation in the carbonizing chambers is, though slightly poorer in calorific power, of lower specific gravity—viz., considerably under 0·4—and consequently, when it enters the gasholder, it immediately ascends and mixes with the gas already there. This explanation has been proved to be correct by exhaustive investigations at the Kirchstein works at Munich.

It has been alleged that the gas from carbonizing chambers is subject to very great fluctuations in calorific power, especially if the charges are not distributed uniformly over the 24 hours. The experiences at Munich, however, show that there is no need on this account not to avail oneself of the great advantage of doing away with night work. The author gives a diagram showing, for the four-days' run at the Dachauerstrasse works just referred to, the curves for the calorific power of the gas made and for the make of gas. The curves show great regularity, and only very moderate fluctuations from the mean value. The settings were charged in three groups—in the morning, mid-day, and evening. From 7 o'clock in the evening till 7 o'clock in the morning, no charging took place. In regular working they would be charged only in two groups—in the morning and in the afternoon. It is evident that no inconvenience arises from want of uniformity in the quality of the gas, from the fact that at the time of the author's address about 85 per cent. of the gas supplied in Munich was made in the carbonizing chambers, and only the small residue in retorts. Of the total consumption, two-thirds was then made at the Dachauerstrasse works, exclusively with chamber settings; and at this works there is only one gasholder. The remaining one-third of the total consumption was made at the Kirchstein gas-works—as to two-fifths in retorts, and as to three-fifths in five chamber settings, which were charged only in the morning between 7 and 10.30 o'clock. Notwithstanding this concentration of the charging of the fifteen chambers in the 3½ hours, no disadvantage is experienced in the gas supply from Kirchstein works.

Professor Bunte's investigations on the Munich chambers showed a consumption of coke as fuel in the furnaces of the setting equal to 15·3 per cent. of the weight of coal carbonized. This figure applied to the Kirchstein settings when the flue gases left the settings at the abnormally high temperature of 977° Fahr. It is evident the regenerative arrangements were not sufficient, and the same comparatively high consumption of fuel was shown in Dr. Drehschmidt's trials. At the Dachauerstrasse gas-works, however, later investigations have shown a consumption of 13·5 per cent. of fuel in the furnaces. This fuel contained 12 per cent. of ash and 20 per cent. of water; but the latter has been deducted in arriving at the 13·5 per cent. quoted for the fuel consumption. The coke used was inferior, and contained 20 to 30 per cent. of breeze. The 13·5 per cent. of fuel must be regarded as satisfactory from the point of view of economy of heat; but it may be pointed out that many gas men are inclined to attach too high an importance to a low fuel consumption, and to disregard its relation to a high make of gas. For instance, an increase in the make of gas of 3 per cent. might fairly be accompanied by an increase in the fuel consumption of about 3 per cent.

As to labour, the twelve settings of 6000 cubic metres (212,000 cubic feet) capacity per diem at the Dachauerstrasse works are charged by four men, of whom two are on the charging and two on the discharging side. Consequently, the make of gas is about 636,000 cubic feet per man per shift. Five minutes are required for discharging and recharging one chamber; but the works' reports show that on the average the time spent per setting of three chambers is twenty minutes. Consequently, twelve settings can be charged in four hours. So that with an eight-hour shift there are still four hours available for cleaning and maintenance work. The work on the discharging side of the settings could readily be carried out by one man if necessary. The heating of the chambers naturally requires some care at first; but after four years' experience, it is left entirely in the hands of the mechanics or foremen.

The regulation of the heats is effected merely by reducing the secondary and primary air supplies during the twenty-four hours, in correspondence with the reduced supply of heat required as the distillation advances. During the night it is in charge of the night watchman, who alters it at fixed intervals according to instructions. No greater heating of the central chamber takes place, as has been surmised in some quarters would be the case. In the latest settings at the Dachauerstrasse works, heating of the roofs of the chambers is completely avoided by providing the settings with inclined firing and four rows of burners; and in this case the central chamber works at a few degrees lower temperature than the side ones. The introduction of inclined firing at the Dachauerstrasse works, combined with the adoption of full charges for the chambers, has given very favourable results.

At the Kirchstein works, there were on the average two to three stoppages of the ascension-pipes in twenty-fours. But such stoppages no longer occur with the new settings at the Dachauerstrasse works, while with them the tar is thinner and more oily, of a brownish colour, and contains less than 10 per cent. of fixed carbon. The yield of ammonia, which Dr. Drehschmidt found varied with the Kirchstein settings between 0·228 and 0·286 per cent. of the weight of coal carbonized, has been considerably improved in the new settings. Two naphthalene washers were provided on the new works; and one of them was brought into use when the works were started. But as, after a few months' working, no perceptible amount of naphthalene was found in the washing oil, it was put out of action. The small amount of scurf formed in the chambers cannot be attributed to the scurf being burned off during the time the chambers are open, because there only five minutes are occupied discharging and recharging each of them. The smallness of the formation of scurf is doubtless attributable to the short length of time during which the gas is exposed to the hot walls of the chamber.

The chief objection raised to the Munich chambers has been their high cost of installation. This is due to their extremely solid and massive construction. Professor Strache has remarked that large chambers can only be employed in the gas industry if they can be kept absolutely sound. Gas consumers must not be supplied with a mixture of coal gas and flue gases. Hence the coke ovens used for the production of metallurgical coke cannot be forthwith adopted in the gas industry. The requisite soundness can only be attained by solid construction such as has been arranged for with the Munich chambers. It has been said the chambers at Dresden give a gas of 0·58 sp.gr., which indicates an admixture of 22 per cent. of flue gases. This is a correct deduction. But it must be pointed out that the Dresden chambers are not on the Munich system. The proportion of carbonic acid in the gas from the chamber settings at Munich varied, according to Dr. Drehschmidt's investigations, between 0·9 and 4·8 per cent. on the 24 hours, and averaged about 2·4 per cent. The proportion of nitrogen in the gas remained below 2 per cent. These figures, taken in conjunction with the average specific gravity of the gas, which ranged between 0·40 and 0·46, show that the chambers were absolutely sound both in regard to the walls between them and the heating flues, and in regard to the doors of the chambers. It is, however, quite true that the first settings were of too massive construction in certain parts, and that the price was consequently needlessly high. It would have been absurd in the first instance to have endangered the adoption of a right principle by economy in material of construction. The settings are now, on the strength of the experiences already gained, being made of lighter construction; and the fire-brick material used is considerably economized. The charging no longer takes place from the top of the settings; and consequently the retort-house at the Dachauerstrasse works is some 16 feet too high for the new bench of settings.

An off-set to the high cost of installation is afforded by the low cost of repairs. Experience extending over nearly four years at the Kirchstein works shows that the annual repairs average about 2½ per cent. of the cost of installation. The repairs needed have been almost limited to the periodical renewal of the two middle walls, which can be done without disturbing the side walls or the roofs of the settings. The roof is propped up by a beam, and a new wall was introduced beneath it. Single slabs have also been introduced quite satisfactorily into the chamber walls. The side walls and buttresses, roofs of settings, bottoms of chambers, and the burners, are, after four years' use, in excellent working order, without having undergone any repair.

The author concluded his address with a reference to the advantages from the "ethical-social" standpoint of the displacement of manual labour by mechanical working on a large scale. Some points from the discussion which followed the reading of the paper will be dealt with subsequently in the "JOURNAL."

Among the subscribers to the Hospital Saturday Fund are the Gaslight and Coke Company, for £532; the South Metropolitan Gas Company, for £211; and the Metropolitan Water Board, for £128.

GASHOLDER TANKS WITH BULGING SIDES.

By F. S. Cripps, Assoc.M.Inst.C.E.

The letter from M. Bonnet in the "Journal" for the 19th inst., in reply to my queries, forms a valuable supplement to his most interesting paper read before the Société Technique.

I venture to produce the salient points in the letter, at the same time converting the French into English measures, as they will then appeal more forcibly to English readers.

The letter states that the curve shown, and for which the stresses were determined in the paper, is not the actual curve adopted for the Simmering tank. The example given has a curved side, which, when subject to water pressure, induces: (1) A vertical downward thrust on each post of 152 tons (the posts being 9 ft. 3½ in. apart, and the vertical pressure being nearly 53⅜ tons for every 3 ft. 3⅜ in. of circumference). (2) A horizontal outward radial force at the top, on every metre (3 ft. 3⅜ in.) of circumference, equal to 29½ tons.

Treating of the latter force first, we find that, the outward radial pressure causes a circumferential tension in the horizontal ring-girder of no less than 959½ tons.

This girder is of wrought iron, and the allowable safe stress was taken at 6·33 tons per square inch in tension, requiring therefore 151½ square inches effective sectional area. Or, if we take the strength of the joints at 75 per cent. of the solid section, then the actual section required would be about 202 square inches. This would be a heavy girder.

M. Bonnet states that the horizontal wrought-iron girder used for the Simmering tank was made much lighter than this, because the curve did not correspond with that of the example described in his paper. As a matter of fact, the girder was 5 feet wide, and constructed of four angle irons, 4 in. by 7⅞ in. by $\frac{9}{16}$ in., with a webb plate 0·7 inch thick. This would give a sectional area of 67·3 square inches, or, allowing for rivet holes, &c., at junctions, say, an effective section of 51 square inches, which, at 6·33 tons per square inch, corresponds with a stress of not more than 323 tons, or roughly only one-third of that required by the example given in the paper. Now, 323 tons circumferential stress would correspond with a radial pressure of barely 10 tons per metre of circumference, instead of 29½ tons.

From this we conclude that the tangent to the upper part of the curve must, in the actual structure at Simmering, approach more nearly the vertical than in the example given in the paper, by this means reducing the outward thrust at the top. M. Bonnet states this to be the case.

It is obvious that, the more nearly the tangent to the curve at the top approaches the vertical, the less is the outward radial thrust on the horizontal ring-girder.

It may be asked, then, What is to hinder us from altering the curve so that the tangent becomes quite vertical; as by doing so, it would appear that the horizontal girder might be abolished altogether? From a purely theoretical point of view, it might be so; but there are many practical reasons against such a course, which we need not discuss.

Now, as to the vertical force acting on the posts: The actual shape of the curve adopted at Simmering has not been given; and therefore the actual vertical force acting on the top of the posts is not ready to hand.

But recurring to the example in the paper, we find it works out at 152 tons on each post, of which there are 72 round the tank. A vertical load of 152 tons on the top of each is considerable, as they are over 40 feet high. Each post would therefore probably require from 40 to 50 square inches sectional area, according to design. These, together with the bracing attaching them to the sides of the tank, would form a heavy item.

Then, we must not neglect to notice the cross strains on the plating, caused by the posts (to which all vertical stress has to be transmitted) being 9 ft. 3¼ in. apart. Between each pair of posts, the distributed vertical force acting on the plated sides at the top is 152 tons; and all this has to be transmitted through the plating to the posts, causing racking or cross strains, which necessitate making the plates thicker to allow for it. The ring-girder at the top should be strong enough in a vertical direction to carry and transmit the tangent downward pull of the sheeting or plating to the posts. If the posts are too far apart, it is easy to see that the tank would tend to buckle between them, unless the horizontal ring-girder is very strong in a vertical direction.

On the other hand, a multitude of vertical posts (braced to the sides of the tank, for the reasons given in the paper) would be expensive.

One other point may be mentioned. Unlike all other tanks, the plates are not quite rectangular, but require to be curved on the edges so as to suit the bulged form of the tank. This makes expensive work.

It is not always wise to save material and increase the labour on the work in consequence. It is often advantageous to use more material to simplify a structure, and at the same time save labour on it.

If I may be permitted to refer once more to the tank I patented in 1901, I would draw attention to the simplicity of its construction. All plates are rectangular; and these, as well as all girders, &c., are free from complicated curves. The weight of the structure, however, would, I think, be greater than that of M. Bonnet's most ingenious device.

AUSTRIAN INVESTIGATIONS ON GAS-FIRES.

The last number to hand of the "Zeitschrift des Vereines der Gas und Wasser Fachmänner in Oesterreich-Ungarn" contains a report by Dr. Fritz Kropf on investigations of gas-fires which have been carried out at the Experimental Works of the Austro-Hungarian Association of Gas and Water Engineers at the Technical College at Vienna, under the guidance of Professor Strache. Four stoves of different makes were investigated—two being of Austrian manufacture, one Swiss, and one, which was without a flue, French.

The investigations dealt with the efficiency, radiation, effect on the air of the room, and the completeness of combustion. The room in which they were carried out was of 4697 cubic feet capacity. The stoves were connected with the chimney by means of a galvanized iron flue pipe, 3½ inches in diameter, which was carried vertically to a height of 5 ft. 8 in., and then horizontally for a length of 3 ft. 7 in. as far as the chimney. A damper was inserted in the flue-pipe 4 ft. 9 in. above the stove, so as to keep the draught on the stove as far as possible independent of any fluctuations in the chimney draught. The gas pressure was kept constant by means of a mercury governor. The proportion of carbonic acid in the flue gases was determined by a Strache's "Autolysator." While the trial was in progress, gas was simultaneously collected in a holder; and the calorific value and composition were afterwards determined. The volume of air required for the consumption of one volume of gas and the volume of carbonic acid produced by its combustion were determined by exploding a sample of the gas with excess of air. The quantity of air passed through the stoves was then easily determined from the proportion of carbonic acid in the flue gases. Details of the determinations on the three stoves provided with flues are shown in the table, p. 265.

The relative proportion of moisture in the air of the room fell in four hours by about 4 per cent. The proportion of carbonic acid in the air after five or six hours' use of the stove was 25 to 35 volumes per 10,000 more than at the start. If the flue was closed by means of a damper, the stoves continued to burn in all cases without any perceptible lengthening or smoking of the flames. Even when the flue was cut off, no carbonic oxide could be traced in the exit gases. Generally speaking, the efficiency increased as the gas pressure decreased. Two methods were used for measuring the heat radiated from the reflector. They were, briefly: (1) The stove was placed in a sheet-metal casing which had in front of the reflector an opening as large as the latter, which could be closed by a slide. The air passed in through sufficiently large openings in the bottom; and the top of the casing led to a wide tube from which the heated air escaped. The effect of the reflector was then easily determined from the quantity and temperature of the escaping air when the slide was open and when it was shut. With stove No 1, the reflector accounted for 5·4 per cent. of the heat given out by the stove, disregarding heat from the flue-pipe; with No. 2, a water-flow calorimeter of the size of the opening for the reflector was placed in front of the latter. The side facing the stove was blackened, and the other side was bright. The water passing through the calorimeter was so regulated that its temperature was as much above the reading of a thermometer placed at the back of the calorimeter as that of the inflowing water was below it. The reflector radiation determination in this way on stove No. 2 amounted to 7·2 per cent.

Compared with the results of the investigation of English gas-fires [the author refers to the first series of researches at Leeds University reported on by Mr. E. W. Smith at the meeting of the Institution of Gas Engineers in June, 1909, the results of which have only during the last few months been reproduced in the German and Austrian gas journals], the stoves examined at Vienna are said by the author to show a considerably higher efficiency. This is attributed to the fact that the English stoves are so constructed that the highest possible proportion of the heat is emitted in the form of radiant energy, and that consequently much heat passes into the chimney unutilized. The object aimed at by the English Committee on Gas Fires was, the author says, to reduce the loss of heat by way of the chimney to 10–15 per cent.; and this object is, he states, entirely fulfilled by the fires examined at the Vienna laboratory. It was considered whether the efficiency could not be further increased by utilizing the gross calorific power of the gas by completely condensing the aqueous vapour from the products, instead of utilizing merely the net calorific power. This could be effected by using the smallest possible excess of air for the combustion of the gas and cooling the exit gases as much as possible. The condensed water could be thrown away daily, or allowed to pass direct into a drain. But the exit gases, thus freed from the greater part of their accompanying moisture, must be re-warmed to some extent in order to give the necessary draught, and must be mixed with more air in order to avoid further condensation. Precautions must be taken to avoid the sulphur acids in the condensed water destroying parts of the stove with which they come in contact. Such a construction, in addition to increasing the efficiency, would present the further advantage that there would be no destructive condensation in the flue-pipes, and the much smaller quantities of sulphur acids in the dry exit gases would have a less rapid destructive

Number of Stove	1.		2.			3.	
Consumption, cubic feet per hour	51	25	66	19	34	22	7
Gas pressure, tenths of an inch	12	12	12	12	8	8	8
Temperature of exit gases, degrees Fahrenheit—							
Back of the stove	411	307	334	252	244	217	145
Before the damper	277	221	262	198	212	176	127
On leaving the room	205	169	234	144	165	140	108
Carbon dioxide, per cent., by volume—							
Back of the stove	4·5	3·3	3·9	2·7	3·8	3·1	1·8
After the damper	4·2	3·0	3·6	2·4	3·2	2·9	1·8
Carbon dioxide in the flue before the damper, volume per volume of gas consumed	0·564	0·564	0·530	0·532	0·534	0·574	0·574
Nitrogen and air in the flue before the damper, ditto	11·976	16·436	13·06	19·10	13·536	17·936	31·326
Aqueous vapour, ditto, ditto	1·009	1·009	1·105	1·137	1·217	1·109	1·109
Nitrogen and air after the damper, ditto	13·00	17·60	14·20	21·86	16·17	18·55	31·326
Efficiency of the stove alone, per cent.	82·6	84·0	85·1	82·9	90·2	89·0	90·5
Do. of the stove and flue up to the damper, per cent.	89·4	89·7	89·0	88·1	92·0	92·0	95·0
Do. of the stove and flue up to the exit from the room, per cent.	92·3	92·3	92·4	92·8	93 8	94·4	96·7
Temperature of the escaping air, degrees Fahrenheit	..	..	..	185	212	216	194

action upon the metal pipes which are mostly used. Flue-pipes which have perished, or become blocked by carbonate of zinc, would then no longer be found.

The foregoing is the substance of Herr Kropf's report, which is obviously incomplete, in that it gives no particulars of the types of gas-fire investigated. But, reading between the lines, it may be assumed that they were all of the copper reflector type with luminous flames, which are the most generally used in Austria and many other Continental countries; and it is probable that they were provided with regenerative passages. A stove of this general type, but evidently without regenerative arrangements, was investigated by the English Committee this year; and the results obtained may be compared with those reported from the Vienna laboratory. The stove referred to is No. 11 in Table I. of the Appendix to the English Committee's report. ["JOURNAL," Vol. CX., p. 774.] The percentage of heat passing up the flue and the temperatures of the air of the room and of the flue gases were not, however, determined for this stove by the English Committee.

INCREASED WATER STORAGE FOR LONDON.

Progress of the Chingford Reservoir.

In the "JOURNAL" for April 14, 1908, we recorded the commencement by the Metropolitan Water Board of a large storage reservoir at Chingford, for the construction of which powers had been obtained by the East London Water Company in 1900. The original estimated cost of the reservoir, a pumping-station equipped with machinery for raising 200 million gallons per day, and other works, was £550,000. The contract was let to Messrs. Charles Wall, Limited, for £340,770. The works were designed by, and are being carried out under the supervision of, Mr. W. B. Bryan, M.Inst.C.E., formerly the Company's Engineer, and now the Chief Engineer of the Board. Since the Contractors commenced operations, they have vigorously prosecuted them. They have had as many as 1200 men employed; while the plant comprises twelve locomotives, 15½ miles of track, and a large quantity of plant. The works, which will be completed in two years, were inspected last Saturday afternoon by the Chairman (Mr. E. B. Barnard, who was Chairman of the Works Committee when they were started) and the members of the Board, who were accompanied by a numerous party of invited guests. When noticing the commencement of the works rather more than two years ago, we gave a general description of them; and the following additional particulars are taken from an illustrated booklet, containing also a short history of the London Water Supply, presented to the visitors on Saturday as a *souvenir* of the occasion.

In order to enable the reservoir to be made, it was necessary to divert the River Lea, the Sewardstone Mill stream, and the Mar dyke, which flowed in very circuitous courses through the site of the reservoir, and to substitute a new channel about three miles in length for the old river course, the length of which was four miles, and the length of the other watercourses about 1½ miles. The new channel most efficiently carried away all last winter's floods, and kept the actual reservoir site free from overflow, and consequently prevented any delay in the execution of the works by reason of floods. No damage whatever has accrued to the river training walls, of which between six and seven miles form the banks of the new channels.

In constructing a reservoir, the most difficult work is the excavation below the bottom of the valley, to enable a perfectly water-tight wall of puddle clay to be joined to an impervious stratum. The puddle trench is about 4½ miles in length; and the maximum depth is 33 feet. The total number of runners driven in for timbering was 58,072. Enormous quantities of water were met with; but the Contractors grappled with this difficulty in a most efficient manner by installing a system of pumping by electricity. Two power stations were erected; the larger containing three gas-engines, two gas-suction plants, two 90-kilowatt and one 60-kilowatt generators, and four oil-engines. The smaller generating station contained a 40-H.P. gas-engine and generator. Electrical energy is supplied not only to centrifugal pumps, but to digging-machines, pug-mills, and also for lighting purposes.

In order to make the main bank, about 3 million tons of earth are required; and 1½ million tons have already been excavated and placed in position. The amount of clay obtained within or near the site of the new reservoir, made into puddle and put in position, is about 210,000 tons, leaving about 90,000 tons still to be placed. The reservoir, when completed, will be capable of containing 3000 million gallons; and the water area will be about 416 acres. The intake channel from the river and the site of the proposed pumping-station are at the Enfield Lock end of the reservoir, where two reinforced concrete footway bridges have been built to carry the diverted public footpath. At the southern end of the reservoir, the public road has been diverted, a new three-arched bridge of reinforced concrete erected, and a new road 40 feet wide constructed as far as the boundary of the county of Middlesex. Several other reinforced concrete bridges have been built. An overflow from the River Lea Navigation has been made, and the towing-path is carried over it, and supported by fifteen arches.

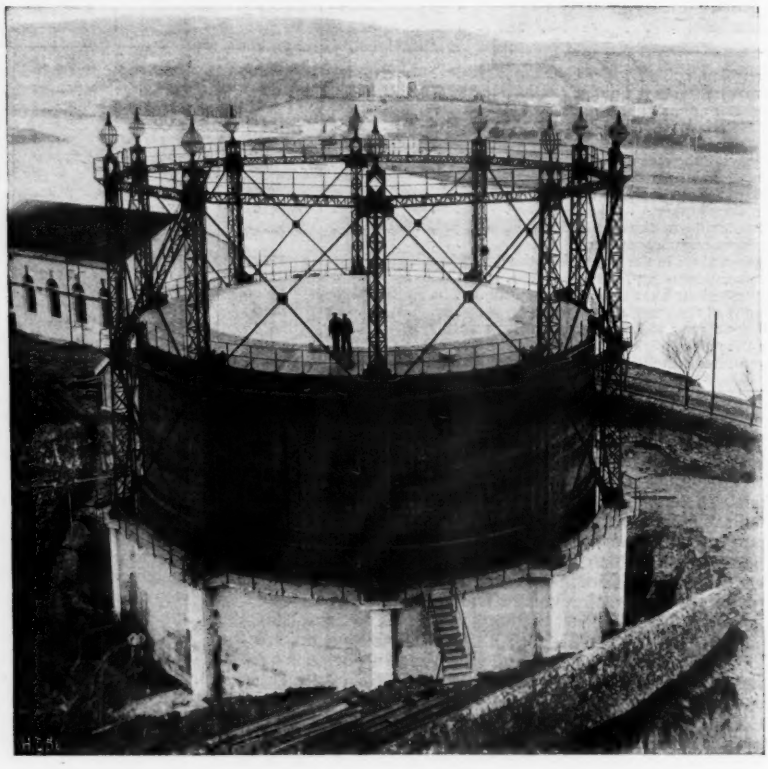
After the reservoir is completed, the stored water will be conveyed by a channel some two miles in length to join the already existing channels near the Chingford pumping-station; thence for 1½ miles into the chain of reservoirs, twelve in number, extending as far south as the High Bridge on the Lea Navigation in the borough of Hackney and Copper Mill Lane, Walthamstow. The stored water finally passes through a canal 1½ miles in length to the filter-beds at Lea Bridge, where, after filtration, it is distributed throughout the Board's eastern district to a population of nearly 1,600,000.

The members of the Board and their guests left Liverpool Street Station by the 1.46 p.m. train, in which compartments had been reserved, for Ponder's End, which was reached shortly after two. The party made their way along the Lea Valley Road to the south-west extremity of the reservoir, where they were received by the Chairman (Mr. Barnard) and Vice-Chairman (Mr. G. S. Elliott) of the Board. Trains were waiting to convey them along the west side of the reservoir to a point near the intake on the River Lea diversion. At this part of the reservoir the embankment has been made to about its full height. Some time was spent here; and Mr. Bryan took the opportunity of furnishing a few particulars in regard to the works. The visitors were then conveyed to another part of the site, when most of them left the trains, and walked along the eastern bank of the reservoir to the south-eastern corner, where the Contractors' offices are situated. Near this place has been constructed the three-arched bridge, in reinforced concrete, over the Lea diversion, in connection with the new road which forms part of the scheme. Here the numerous company partook of light refreshments served in marquees on the ground. The band of the Board's Employees' Association was in attendance, and played selections of music during the afternoon. As there was a little time to spare before the train left Ponder's End for London, some of the visitors were driven to the outlet works of the new reservoir, which are near the Chingford Wells pumping-station, where Mr. Bryan explained how the water will be conveyed to the extensive group of reservoirs (constructed by the East London Water Company) lying to the south. This brought to a close an inspection which was full of interest; and, in the course of it, opportunity was taken from time to time for informally congratulating the Board, their Chief Engineer, and the Contractors, on the progress which has been made with this important addition to the water storage of the Metropolis.

Gaslight and Coke Company's Dividend.

We are informed by the Secretary of the Gaslight and Coke Company (Mr. Henry Rayner) that the accounts of the Company for the past half year show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend the payment of a dividend at the rate of £4 13s. 4d. per cent. per annum, while carrying forward to the next account £542,370 3s. 10d. (which includes a balance of £32,746 13s. 1d. taken over from the late West Ham Gas Company on Jan. 1 last). The dividend is the same as for the June half of last year; but the carry-forward is £132,477 more. Excluding the West Ham balance, the amount is £99,731 more.

A REINFORCED CONCRETE GASHOLDER TANK.



The current number of "Concrete and Constructional Engineering" contains some particulars, with illustrations, of a reinforced concrete gasholder tank erected at the San Sebastian Gas-Works, under the supervision of M. Wenceslas Aguirre-bengoa. As this is the first tank built with the new material in Spain, special interest attaches to it; and in presenting the following details of the work, we acknowledge our indebtedness to our contemporary for the use of the block which accompanies them.

Owing to the great increase in the consumption of gas, it was necessary to increase the storage capacity of the works; and it was decided to erect a holder of 212,000 cubic feet capacity, with a tank on the Hennebique system. The tank is 78 ft. 9 in. diameter and 25 ft. 8 in. high. The wall is divided into ten sections by the same number of T-shaped buttresses to support the iron stanchions of the tank. The width of the circular bars of iron is 2 ft. 8 in., and they are 8 inches thick. In designing the tank, the calculations were made in the same way as for a circular reservoir, under the assumption that it was divided into zones 20 inches high; the buttresses only being arranged to receive the metal stanchions. The work was carried out in two-and-a-half months. The concrete was well rammed to prevent porosity and to lessen the danger of filtration. When the centring was removed and the interior and exterior of the tank were rendered with portland cement and gravel in the proportion of 1 to 2, a test was undertaken for resistance and impermeability, by filling the tank with water. The test proved most successful, and during the time it lasted no cracks or displacement whatever were noticed. The general appearance of the tank is pleasing.

GERMAN ASSOCIATION PHOTOMETRIC REPORT.

Tests of Safety Lamps.

In our account of the proceedings at the annual meeting of the German Association at Königsberg last month, it was mentioned that the report of the Photometric Committee had not been printed along with the reports of the other Technical Committees of the Association; and it was stated that it referred mainly to investigations on safety lamps for use on gas-works. The report (signed by Dr. W. Leybold, of Hamburg, as Chairman of the Committee), has now been published in the "Journal für Gasbeleuchtung," and the following is a summary of its contents.

One of the rules for the prevention of accidents in gas-works in Germany is to the effect that where spaces such as apparatus and purifying-houses, gasholder-houses, and vaults under gasholders, have to be entered in urgent cases with a light, the latter must be furnished only by electric safety lamps or safety lamps complying with prescribed conditions and kept in proper order and tested from time to time. On all large gas-works, electric lamps have lately come into extensive use. Some of them have fixed small incandescent lamps, while others have a lamp attached to a flexible wire by means of which they can be conveniently directed to the spot where the light is required. On works where electric current is available, the lamps are re-charged on the spot; but in other cases charged accumulators are used to replace the exhausted ones. An electric safety lamp answers well, and is unobjectionable; but it is essential that it should be switched on in the open before the room is entered.

In most cases, however, the safety lamp which was devised by Davy in 1816 for use in mines is employed. Davy discovered that the flame did not ignite firedamp through gauze containing over 400 meshes to the square inch, provided the gauze did not become red-hot. The original safety lamps were constructed of such gauze; but since little light could pass through it, the portion round the flame through which the light should pass was afterwards constructed of glass, the air circulation being maintained through wire gauze. Probably the Imperial Continental Gas Association, who supplied gas in Berlin and Hanover in 1826, introduced the safety lamp into gas-works in Germany. At the Hamburg Gas-Works, a safety lamp exists which is still in perfectly usable condition, and probably dates from the time when the town was first lighted by an English Company in 1845. Lately, however, a whole series of safety lamps of different types have been constructed, though they all depend on the same principle. Many thousands of these lamps are in use in coal mines; and the mining authorities prescribe certain points which must be observed in regard to them. These points are, briefly, that each lamp must be so arranged that a completely tight joint shall be always maintained between the different parts of it; the glass used must be well annealed, and its ends cut exactly at right angles to its axis; the wire gauze must contain at least 144 openings of uniform size to the square centimetre (936 to the square inch); the wire of which the gauze is composed must be between 0·3 and 0·4 mm. (about 0·012 and 0·016 inch) in thickness; and any way in for the air must be protected by wire gauze of the above description. These prescriptions have been adopted in the rules for the prevention of accidents on gas-works, and therefore apply to the lamps in general use.

Safety lamps are not much required on gas-works; and consequently each works possesses only a few. But they have to be kept in proper condition, so that they may be ready to use at any time. At a recent inspection of works, some lamps were found which did not comply with the above-named prescriptions, though they were sold as safety lamps. Neither the inlet nor outlet was fully protected by wire gauze. The lamps fired a mixture of gas and air. There is a great difference between the use of lamps in mines and on gas-works. The lamps for mines must be locked so that they cannot be lighted by a match in the mine. Some of them are provided inside with friction appliances, so that they may be re-lighted on the spot; and in these cases benzoline is used as the fuel. The lamps can only be opened at the issuing office. Benzoline lamps, however, have the disadvantage that the fuel volatilizes, and they have to be filled shortly before they are required. As safety lamps when wanted on a gas-works are generally needed suddenly, benzoline lamps are on this account objectionable; and the oil-lamps, which are always ready for lighting, appear preferable. The oil, however, thickens in course of time; and it is necessary to light the lamps once a month so as to ascertain if they are in usable condition or whether the oil requires renewal.

Another difference between mines and gas-works is that the proportion of firedamp or methane in mines is small, and the maximum explosive force is attained with 9½ per cent. of methane. As a rule, high percentage mixtures do not occur in mines. In gas-works, on the other hand, an escape of gas—for instance, in the purifying-house or in the basements where the connections and valves are assembled—is frequently such that the mixture of gas and air approaches pure coal gas, and then a whole series of explosive mixtures occur as it becomes diluted. The mixtures containing much gas and little air burn on ignition without explosion; but they are almost as dangerous, on account of the risk of fire, as explosive mixtures. Safety lamps for use on gas-works must therefore be so designed that they ignite neither explosive nor combustible mixtures nor pure gas. A simple method of testing lamps is to blow gas on to them, while alight, from flexible tubing. Ignition should not take place in any case; but the lamps

should quietly go out for want of oxygen. As a practical test, which may be applied anywhere, this method is good enough. For testing a large series of lamps, however, special apparatus is desirable, such as is used in the experimental laboratories of collieries. This, however, is on a large scale; and a smaller testing apparatus has been designed in which the lamps burn in a jacket of coal gas or air gas. An apparatus of this kind which is made by a Zwichau firm proved unsuitable for the Committee's investigations, because of the varied dimensions of the lamps they had to test.

A special testing apparatus was therefore devised for the investigations, in which lamps of different sizes could be readily examined. This apparatus consisted of a sheet-metal cylinder, 26 inches high, with a lid having in its centre an easily opening flap-valve. A ring bunsen burner was provided in the lower part of the casing, 8·6 inches in diameter, and having 18 holes. A metal plate, 6·8 inches in diameter, for receiving the lamps was supported on brackets above the burner-ring. The flame of the lamp could be readily observed through a sighting-hole, with thick glass, in the side of the cylinder. When the gas had been passing through the bunsen ring for four or five minutes, the proportion contained in the mixture inside the cylinder was determined by means of a Strache's "Gasoscope." The proportions of gas in the mixture varied within certain limits with the gas passed through the burner. For instance, with a rate of flow of gas to the burner of 3·5 to 4·2 cubic feet per hour, the proportion of gas in the cylinder was 17½ to 22½ per cent. When the rate of flow was increased to 7 cubic feet per hour, the proportion of gas was 29 per cent. Further increase in the supply of gas, however, did not appreciably increase the proportion in the mixture in the cylinder.

Sixteen specimens of safety lamps submitted by various firms have been tested in this apparatus by the Committee. Of these, only three were seriously defective. One of the three was a large oil-lamp with a flat wick, part of the air supply to which was drawn through a tube passing through the oil-reservoir, and the mouth of which was protected with wire gauze. The flame of this lamp was extinguished in four minutes when gas passed into the experimental apparatus at the rate of 3·5 cubic feet per hour; but when the rate was increased to 4·2 cubic feet, the gas burned alongside the oil-flame as it entered through the tube which passed through the oil-reservoir. The result was that the glass of the lamp broke. The gas-flame continued to burn in the lamp after the oil-flame had been extinguished. The tube had probably been taken through the oil-reservoir by the designer of the lamp with the object of cooling the oil. The second lamp which was defective was a candle lamp with two glass cylinders, and with the air supplied through the bottom of the lamp and from the top through the intermediate space between the two cylinders. Both air-inlets were protected with wire gauze. The flame was extinguished when gas was passed into the testing apparatus at the rate of 3·5 cubic feet per hour; but when the rate was increased to 4·2 cubic feet, the gas burned within the lamp, melted the candle, and broke the glass cylinders. The wire gauze guarding the lamp was too coarse—viz., 8 meshes to the centimetre (20 to the inch). The third lamp which failed was a benzoline lamp which was found in a small gas-works. The air was admitted at the side through unprotected holes, 1½ mm. (0·06 inch) in diameter, and also at the top through a short wire crown. The exit holes were outside the protecting wire crown. The lamp fired in the testing apparatus. Of the other lamps tested, six are described as ordinary miners' lamps, two as large miners' lamps, three as large oil-lamps with flat wicks, one as a large candle-lamp, and one was an old safety lamp from the Hamburg Gas-Works of a date about 1845. All the lamps, except the last and those referred to as defective, were constructed by firms who make a speciality of these lamps.

Having regard to the danger attending the use of an unreliable safety lamp, the Committee recommend that all safety lamps should at least be tested by the simple method of blowing gas on to them. The investigations are being continued in the direction of ascertaining the light given by the lamps. The Committee suggest that it would be useful if the different constructions adopted for portable safety lamps for use on gas-works were exhaustively investigated; and they recommend that the Instructional and Experimental Works of the Association at Carlsruhe should be entrusted with this investigation. The works would then be in a position to say which types of safety lamps should be permitted on gas-works.

DEPRECIATION, CAPITAL REDEMPTION, AND RENEWAL AND EXTENSION FUNDS.

By F. Kordt, of the Düsseldorf Corporation Gas-Works.

[Abstract-Translation of a Paper read before the Meeting of the German Association at Königsberg.]

A very important factor in calculating the prime cost of gas or in determining the surplus shown in the balance-sheet are the allowances for depreciation and redemption for various purposes. In private industrial undertakings, these allowances are settled by the manager and the board of control according to the requirements of the case; but in municipal concerns the financial condition of the town is apt to be taken into consideration, and the works may be stinted in consequence. Municipal works, however, ought not to be differently treated in this respect to private works.

Often the opinion is expressed in municipal administrations that it is unnecessary to write-off so much because the works have been kept in good order. But we all know that it is not merely the ultimate wearing out which settles the amount to be written off. What gas engineer has not had to demolish settings, retort-houses, apparatus, gasholders, &c., before they were in reality worn out, in order to erect larger installations in their stead? Frequently, also, older plant is destroyed before its time, so that newer and improved plant, embodying advances made, may be introduced. Ample depreciation allowances are even more necessary with municipal than with privately-owned industrial undertakings. If too little has been written off, and the works become antiquated and no longer able to meet competition, if they are owned by a company the shares may (if need be) be called in, and fresh shares issued, in order to provide the money required for modernizing the works. But if the works belong to a corporation, this plan cannot be followed. New work has to bear, not only its own interest and depreciation charges, but also any amounts left outstanding in respect of old work.

There are different ways of providing for the redemption of the value of an installation in municipal undertakings: (1) By paying off a proportion for amortization of the capital employed, and amassing a renewal or extension fund; and (2) by writing off from the book value of the installation. Both methods attain the object, provided the allowances are high enough. Ordinarily for the redemption of the capital expended, a fixed percentage is allowed for interest and redemption, so that the interest saved is applied to increase the redemption allowance. Thus the redemption of capital expended by a rate of interest of 4 per cent. is effected in 41 years by an allowance of 5 per cent. for interest and redemption, or in 28 years if 6 per cent., or in 21·6 years if 7 per cent. is allowed. The allowance of 5 per cent., therefore, means writing-off at the rate of about 2½ per cent.; that of 6 per cent., at the rate of about 3·5 per cent.; and that of 7 per cent. is almost equal to 5 per cent. on the capital expended. If, in addition, renewal and extension funds are accumulated, it is evident that sufficient provision can thus be made for depreciation of the work. But usually money passes sparingly into the renewal and extension funds—especially when the municipal chest is not well filled. The renewal fund then is applied for necessary extensions, or *vice versâ*.

It is therefore more correct to write-off on the separate values, and to cover the redemption of the capital on the installation, as well as ordinary extensions, by the amount so written off for depreciation. This is the commercial practice. It matters not precisely what is done with the sum written off, so long as it is applied in the interest of the works. For instance, if the capital outlay on a works is £50,000, and in consequence of diminution of value £5000 is written off, this sum may be applied to the redemption of capital or for renewals or extensions. The financial state of the works is the same in either case. Depreciation may, however, be written off on the book value instead of on the capital outlay, though the latter at first glance appears to be the simpler. On looking still farther, however, it will be seen to be troublesome in respect of the detail involved. There are additions to be made to the different accounts every year. The value of apparatus, such as meters, installed in one year has to be completely written off a year before that of similar apparatus installed a year later. The procedure becomes even more complex when some plant or building is discarded before its value has been completely written off at the ordinary rate of allowance for depreciation. If further changes are made, it becomes still more troublesome to trace out the year when the capital outlay should be extinguished. On the other hand, if depreciation is written off on the book value, the values in the books fall off gradually until only a trifling residual sum remains. If, however, plant is discarded before the normal time, its residual value must be written off specially. The author gives a table for rates of depreciation, from 2 to 20 per cent. and for one to sixty years, to facilitate the determination of the book value of plant at any year for every 100 marks (£5) of capital expended on it. He then gives examples of the manner of using the table in cases where plant is scrapped before its value has been almost completely written off.

The next question is the important one of the percentage rate of depreciation which should be written off the book values on gas-works in general, in order to avoid a false value being maintained in the balance-sheet. In considering this point, special attention must be given to the revolutionary changes required by the technical advances in the industry. At the Düsseldorf Gas-Works, the latest rates of depreciation adopted are: On buildings, 3 per cent. of the book value; on gasholders, 6 per cent.; on retort-settings and apparatus, 10 per cent.; on railway and tramway plant, 6 per cent.; on mains, 4 per cent.; and on meters, 12½ per cent. According to the books for last year the sum written off averages 6·6 per cent. of the total book value. At this rate, the value of the plant, &c., after 33 years have elapsed will still amount to 10·6 per cent. of the original cost. The author would retain the above-named rates, except that he would write off buildings at 5 per cent., instead of 3 per cent., of the book value, and apparatus at only 7½ per cent., instead of 10 per cent. At these rates a residual value of 10 per cent. would be reached for buildings in 44 years, for holders and railway plant in 37 years,

for retort-settings in 22 years, for apparatus in 29 years, for mains in 56 years, and for meters in 17 years.

Such depreciation allowances are, however, in the author's view, very finely cut; and hence it has been the practice at Düsseldorf to augment them by writing off special sums in addition. The foregoing allowances must anyhow be taken as the lowest that are permissible. The special sum that was written off at Düsseldorf last year was equivalent to 4·6 per cent. of the book-value; and adding this to the 6·6 per cent. ordinary depreciation, the total written off was 11·2 per cent. At this rate, a residual value of 10 per cent. of the original cost will be attained in 20 years, which, in the author's view, is a fairer life to assume for gas-works than 33 years, which he regards as too high. Mr. Körting has expressed the opinion that a suitable allowance for depreciation on gas-works is an average of 4 per cent. on the purchase prices. This would bring down the value to the residual 10 per cent. in 22½ years. This 4 per cent. allowance seems to the author quite proper; and the result is much the same as writing off 10 per cent. of the book value according to the table which he has compiled.

In many towns, the system of book-keeping adopted in public offices is followed for the municipal industrial undertakings. In that case, the sums written off should be placed to an extension and sinking fund account; and the residue, after amortization charges have been met, should be applied solely to extensions. The sums written off must not find their way into the municipal chest, to be utilized for general municipal requirements or to cover other obligations. They must be applied solely in the interests of the gas-works, or remain untouched. Then when gas-works plant becomes out of date and has to be written off, the amount is to a large extent already in hand.

The author arrives at the conclusion that with small gas-works, having relatively few receipts and expenses, it is best to write off depreciation on the initial outlay, so that the amounts to be written off will be uniform and not too high at first. With large works, on the other hand, having relatively big receipts and expenses always, and numerous additions and extensions to buildings and plant, it is better to write off on the book value, as is done in almost all industrial works. The figures instanced must not be regarded as of universal applicability. The sums to be written off must be determined separately for each particular case. Consideration must be given to the generally increasing value of land, as well as to the increasing cost of materials and construction in, *e.g.*, gasholders and mains laid in a firm sandy soil. For instance, water-mains laid in Düsseldorf in the seventies, and since replaced by mains of larger size, have remained so well preserved that they have been utilized again by the gas undertaking. The sums to be written off depend on the circumstances of each instance. It will not, however, be contested that in all cases the depreciation allowances must be based on expert judgment, and not be settled according to the financial exigencies of the municipal exchequer for the time being.

CONTROLLING THE WATER SUPPLY TO GENERATOR FURNACES.

By M. Camille Roche.

[From a Paper read before the Société Technique du Gaz.]

The basis of the adjustment of the supply to a generator furnace is one described by the author in a previous communication —made to the Congress of 1908.* It is the use of a small aperture in a thin plate. In the former paper, the device described was an aperture in a thin tin plate (part of the drum of a meter) fixed between two flanges; the whole being provided with a cock and attached to a vessel with a constant water-level. The plate thus arranged is not very accessible, owing to the thickness of the clamping flange. Any particles of dirt or cinder carried along by the liquid are liable to choke the aperture, and the plate has then to be withdrawn by unscrewing one of the flanges—a somewhat lengthy business.

The author has therefore devised a modified method, according to which the pierced plate is instantly accessible in case of obstruction. A cup, or nipple, is obtained—of bronze for plain water, or of anti-friction metal for ammoniacal liquor. To one end of this is soldered the piece of metal cut from the drum of a meter. The fine hole has now to be pierced in the cup that is thus formed. In the event of the aperture ever being choked by suspended matter in the water, all that is necessary is to pass a finger under the cup to start the flow again. Naturally care should be given to the clearness of the water, in order to ensure a constant passage. Also throughout a works it is well to preserve a constant level of water above the apertures. On all pieces of apparatus the same apertures will then provide the same supply.

Passing now to consider the adjustment of the steam admitted to the generator furnace, one constant-level vessel will serve for two furnaces each having two vaporizers. It should have four delivery apertures and four funnels, by which to receive the liquid in four lots. The apparatus is placed somewhere handy, on a level with the eyes—say, on the wall opposite the front of the furnace. The supply is controlled to give from 600 to 700 grammes of water for every kilogramme of coke consumed in the generator. This is the best proportion—the clinker remaining as cinders, the grating of the furnace not suffering, and the inlet of the primary air being reduced. The water which enters into the upper funnel is led by a pipe close to the hearth. A second funnel is placed there, protected from dust by a removable cap, by means of which it can be seen from below whether the water is being delivered normally. From this funnel the water is conducted by the syphon to the vaporizer, where it is evaporated, and passes on to mix with the primary air. The best working is obtained when the water is not all vaporized, but when a few drops reach the hearth of the furnace from time to time along with the steam. Under these conditions, the cinders are slightly moistened, and the furnace bars are better protected. Ordinary boilers supplied in this way for two years past have shown no sign of getting out of order.

The cooling of ascension-pipes, by the use of water within them, as described by the author in 1908, has given excellent results so far as the tar is concerned. There have been no obstructions; and after being eighteen months in use, the pipes thus cooled did not require cleaning when the furnaces were taken down. But the water mixed with the gas has caused a certain amount of trouble. When plain water is used, it reaches the cisterns and causes dilution; while if the pipes are watered with ammoniacal liquor, an appreciable loss of ammonia takes place. These drawbacks have been obviated by cooling the outsides of the pipes; and the controlling of the water according to this system was conducted as follows: In place of the delivery apertures previously used inside the pipes, others, giving about double the quantity of water, were employed. In order to distribute the water around the pipes, a band of hemp fibre, about 25 mm. in width, was wound spirally down the length of each pipe. This material, owing to its porous nature, prevents the water from splashing, and does not char under ordinary conditions. It is difficult to prevent it doing so when drawing the retort, and then it is better to remove the hemp or use a more ample supply of water from a larger aperture. A single tarred strand can be employed in place of the band; but it does not distribute the water so well. At the bottom of the pipe is placed a flange. A spout conducts the water into a gutter, whence it flows along a very gentle inclination towards the furnace. The flange is of cast iron; the two halves of each semi-section being placed edge to edge, and locked together by a flat ring; the whole being made tight with cement.

The cooling arrangement above described has so far proved a most satisfactory solution of the previous difficulties—to such a degree, in fact, that it is difficult to understand why it is installed in so small a number of works. Its outstanding merits are that the ascension-pipes are kept clean, manual labour is saved, and loss of gas and stoppage of the retorts are obviated. Moreover, the tar in the hydraulic main remains fluid, and passes easily to the outlet; while the gas produced maintains an even temperature and illuminating power.

* See "Journal," Vol. CIII., p. 335.

CAULKING GAS-MAINS BY MACHINE.

The number of "Progressive Age" for July 1, contained an illustrated article showing how the Consolidated Gas Company of New York have solved the problem of caulking gas-mains quickly and well by means of a compressed-air machine, which has been in use on a 48-inch main. The method of caulking by hand was slow and of doubtful uniformity, especially at the botton of the pipe, where, owing to the awkward position of the workman, the result was poor at the best. Hand work required two-and-a-half hours to yarn the joint, and seven hours to caulk with lead wool, or one joint completed per day of ten hours with two men working on the joint. Tarred rope to the extent of 2½ inches was rammed in for the yarning; and on top of this 2½ inches of lead wool. About 160 lbs. of lead wool were used for each joint by this method. With the compressed-air machine, the same proportions of yarn and lead wool were used at first. Observation soon disclosed the fact that under the air-hammer 187 lbs. of lead wool were being forced into the space that was hitherto occupied by 160 lbs. The quantity of lead wool caulking was then cut down to 2½ inches; and the amount of lead wool used per joint is now about 160 lbs. The yarning process is done by hand, as no tools have yet been perfected for it. Two men are employed for a joint—one on either side of the main; and the calking-iron is alternated between them.

The labour-saving possibilities of such a machine as that described are readily seen when the results of the limited trial on this work show that two joints are completely yarned and caulked by two men in a ten-hour day, against one joint in the same time with the same number of men working by hand. Further, the pressure of the caulking-iron is uniform, and ensures a perfect joint, using the same amount of lead wool pressed into a smaller space. The air-compressor is driven by a 15-H.P. gas-engine; the whole being mounted on a truck, and moved about by a team of horses. The gas-engine consumes about a gallon of gasoline per hour. The pressure maintained averages 60 lbs. per square inch.

Mr. Charles Crowther-Smith, of Anglesea House, Shirley, Southampton, for many years Secretary of the Southampton Gas Company, whose death was announced in the "Journal" for the 21st ult., left estate valued at £15,982 gross, with net personalty £10,845. His will contains a number of bequests to some local hospitals and other benevolent institutions.

REGISTER OF PATENTS.

Retorts for the Production of Gas and Gas Coke.

BOWING, J., of Wandsworth, S.W.

No. 12,583; May 27, 1909. No. 11,491; May 9, 1910.

These inventions relate to improvements in retorts for the heating of which gaseous fuel is made use of, and to retorts provided with tall vertical walls with a relatively narrow distilling chamber.

The patentee proposes to construct a rectangular chamber of fire-clay or other suitable material (such as fire-brick) of any convenient dimensions in respect of height and length; the length being measured fore and aft. Its breadth is determined by considerations to be hereafter referred to. The side faces of the chamber are so constructed and finished that when a number of chambers are arranged side by side the side faces form the cheeks of a series of flues by which the retorts are heated. These flues are intended to serve the purpose of supplementary combustion chambers in which the burning of the heating gases can be completed, and they are so designed as to secure the fullest possible contact of the incandescent gases with the cheeks. With this object, the flue space is preferably divided up into vertical channels by ribs formed of the material of the flue walls, or of other suitable refractory material; and the side walls are placed at a distance of (approximately) an inch from one another. The object of thus using a very narrow flue is "to obtain the smallest breadth of flue that will allow the free combustion of the burning gases to take place, so that the heat may be generated as close as possible to the walls, because that part of the flame which is in actual contact with the walls of the flue is much the most effective part of the flame." It is, therefore, desirable to minimize the distance separating the sides of the retorts from one another. This distance, which determines the breadth of the flue, must, however, itself be determined with reference to the smoothness or roughness of the finish of the faces of the retorts. The inventor has found that using ordinary fire-clay carefully finished and with retorts up to 8 feet high, a breadth of about an inch gives the best results. In this way, he secures that a very large proportion of the heat shall be taken up by the wall. His latest experience in the working of such flues has led him to the same result as that reached in connection with his earlier work upon the destructive distillation of coal, and embodied in patent No. 24,687 of 1906.

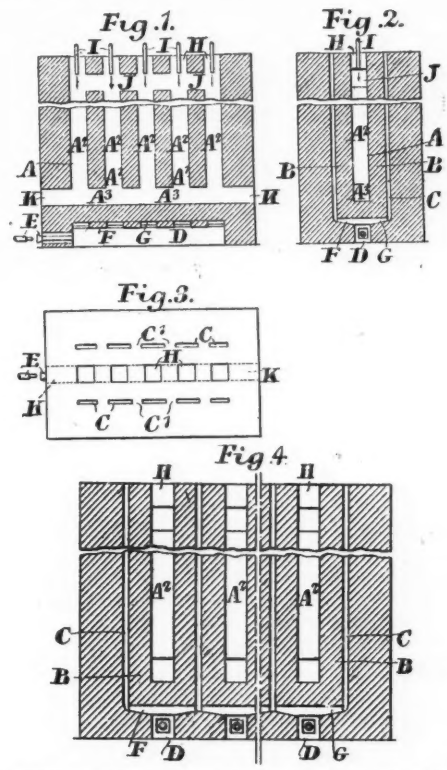
Continuing the specification of his later patent, the inventor remarks: "I may use for the purpose of supplying the gaseous fuel to the flues a series of burners fitted upon a tube in the ordinary way in which such burners are arranged for the supply of gas-fires; and in that case I employ a combustible mixture in which the proportion of air is rather less than what is required for the complete burning of the gas, and is so adjusted as to minimize the risk of firing-back into the supply pipe. The air necessary to complete the combustion is supplied externally to the nozzle and within the flue. The bunsen tube, with its nozzles, is arranged in a tunnel placed at the foot of the flue; and by means of suitable doors a properly adjusted air supply is admitted to the tunnel and enters through it to the flue. These tunnels are placed under the middle of the bottom walls of the retort-chambers; the two flues in the two sides of each retort being led round to the tunnel. Thus each tunnel serves two flues; and each flue is served by two tunnels, except the two endmost flues of the series, which are, of course, in communication with only one tunnel each."

In the course of his recent experimental work, he says he discovered that with gas supplied at a pressure of about 6 inches of water, it is possible with great advantage to modify this form of burner; and he now prefers to construct his gas-burner in the following way: The tunnels above referred to, instead of containing the gas-pipes fitted with nozzles for the supply of the combustible mixture of gas and air, are left quite empty, and closed at one end with a fire-clay door, through which an opening of suitable dimensions is made for the introduction of the gas and air supplied for the purpose of maintaining combustion. The nozzle through which the gas and air for maintaining the flame are supplied is placed outside this door and directed towards the centre of the opening. In this way, a gas-jet is projected through the opening in the door; and it sucks in with it a supply of air sufficient for the purpose of completing the combustion. A metal or fire-clay cone is placed in front of the nozzle for the purpose of dividing up the air supply, so that the gas-jet introduced through the cone may contain such an excess of gas as to be incapable of ignition, whereas air will enter through the annular space surrounding the cone in the opening of the door. In this way, a strong jet of gas is forced into the tunnel and ignited only after its admission to the tunnel—the distribution of gas and air in the throat of the tunnel being such as to prevent the flame from travelling back to the gas-nozzle. For communicating with the flues, each tunnel is provided with a number of ports along the upper angles in which its side walls meet the top of the tunnel. The areas of these ports are so arranged that the flame travels to the farther end of the tunnel and fills the flue through its entire length with incandescent gas.

The retort-chamber having been brought to the working temperature, is filled with carbonaceous material prepared and disposed in such a manner as to permit steam to flow through the entire mass; and it is then closed against the admission of air. Water or steam is introduced through a suitable conduit into the retort; and, the necessary temperature—say, for instance, from 600° to 800° C.—being maintained by continuous firing in the flues, water gas comes off. Under these conditions, the operation becomes a continuous one, since it is possible to arrange hoppers for feeding in the coke at the top of the retort, and suitable ashpits for discharging the ash and clinker from the bottom or side.

Fig. 1 is a longitudinal section of a single retort adapted to the production of water gas. Fig. 2 is a transverse vertical section of fig. 1. Fig. 3 is a plan of the retort shown in section in figs. 1 and 2. Fig. 4 is a section illustrating the arrangement of a battery of retorts.

A is a rectangular chamber, of fire-clay or other material, divided by a series of walls A^1 so as to form a series of retorts A^2 of small dimensions communicating with one another at the bottom by openings A^3. The chamber is surrounded by walls B, the space between which and the outer surface of the walls of the chamber A forms the flue C, which is preferably divided up into vertical channels by ribs C^1. D is a tunnel formed below the rectangular channel A into the mouth of which the bunsen tube or burner E is introduced; so that the flame is projected into the tunnel and passes up through the flues around the walls in the manner described.



Bowing's Retorts for the Production of Gas and Coke.

The bottom of the rectangular chamber A is supported above the tunnel upon a series of bridge-pieces F having spaces G between them which form ports through which the flames pass from the tunnel into the flues C. When a battery of chambers is employed, each chamber is provided with an independent tunnel and burner as in fig. 4.

H are openings formed in the roof of the chamber A through which the charge is introduced; and I are pipes in these openings for the introduction of water. If steam is to be used, a single pipe I only is necessary; the steam distributing itself to the various parts through a passage J formed above the walls A^1.

The gases generated escape through the passages K, which also serve for the discharge of the ash and clinker from the chamber.

Decomposing Hydrocarbons.

LESSING, R., of Southampton House, High Holborn, W.C.

No. 15,071; June 28, 1909.

In his specification the patentee says: "It has been proposed to decompose hydrocarbons in a gaseous or vaporized state, and more particularly the products of the destructive distillation of coal into the elements—namely, carbon and hydrogen—by passing it through heated gas-retorts or coke-ovens charged with a contact material, such as broken brick, coke, iron, or the like. When working according to this proposal, the carbon obtained, however, is not of sufficient purity to be of marketable value—being mixed or in close contact with the above-mentioned materials." The object of the present invention is to obtain, besides hydrogen of a purity sufficient for commercial purposes, carbon in a pure state and without admixtures, so that a marketable product is obtained. With this object in view, the invention consists in passing the gas or gases through retorts, chambers, coke-ovens, or the like, which are either empty or partially or completely charged with carbon, such as is obtained according to his invention; no packing material of a character foreign to the carbon obtained in the retorts being employed, so that pure carbon is obtained within the retort, chamber, or oven.

The hydrogen gas produced is especially intended for the charging of aërial craft requiring gas of low density.

The invention may be carried into effect in various ways, of which the following is given as an example: He produces coal gas in an ordinary gas-making plant and leads it through a suitable inlet into one end of a gas retort or chamber, which may be of the horizontal, inclined, or vertical type—the retort or chamber being filled with carbon obtained according to this invention. The retort or chamber is heated to a temperature of (say) 1000° to 1300° C.; and care is taken to adjust the rate of flow of the gas in such a manner that complete decomposition of the hydrocarbons contained in it into hydrogen and carbon is obtained. The rate of flow depends on the heating surface available, the temperature of the gas admitted, and its composition; gas containing a large percentage of methane, for instance, requiring a lower

rate of flow than gas containing less methane. The hydrogen is taken off through the outlet or ascension pipe usually provided on gas-retorts by suitable means—for instance, an exhauster—and conveyed into a holder or to its place of consumption after having been cooled and scrubbed.

It has to be borne in mind, the inventor points out, that the volume of the hydrogen produced is considerably larger than that of the gas admitted compared under equal conditions of pressure and temperature. For instance, methane, which is a chief constituent of ordinary coal gas, decomposes according to the equation

$$CH_4 = C + 2H_2.$$

One volume of methane yields two volumes of hydrogen. Consequently, for the rate of flow of the gas entering the retort, which has been chosen with regard to the requirements of the decomposition, the velocity of the hydrogen leaving it has to be adjusted accordingly. He prefers to maintain positive pressure within the retort, so as to avoid contamination of the gas by diffusion of the flue gases into the retort. The carbon produced by the decomposition is deposited upon the carbon charge and the walls of the retort or chamber. From time to time, it is wholly or partially removed as soon as it shows signs of obstruction to the required flow of gas, and is then replaced by a fresh charge of carbon of suitable shape and size.

When carrying out the process without any special contact-material, the patentee has found that he can obtain the carbon in the form of fine powder instead of the denser product which is deposited on the walls and carbon charge.

Instead of using the crude and hot gases as obtained directly from a coal-gas plant, he may employ gas previously passed through condensing and purifying plant, or gas from a district main. He prefers to do this if a higher purity of the hydrogen produced is required.

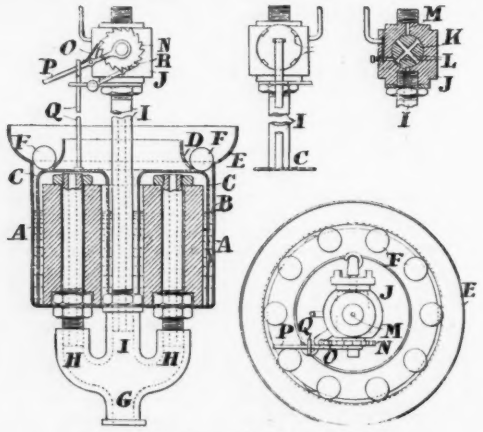
In many cases, especially when using coal gas, it is, he says, advisable to pre-heat it before entering the decomposition retort or chamber. This may be effected by imparting to it the sensible heat contained in the hydrogen issuing from the retort, or by any other suitable means; and this may be carried far enough to obtain a preliminary partial decomposition of hydrocarbons which should go far enough to attack the heavy hydrocarbons—yielding a carbon of lower density, but which would leave the more stable hydrocarbons (notably methane) essentially unaltered. Upon subsequently yielding to the influence of the higher temperature in the decomposing vessel proper, the hydrocarbons left undecomposed during the preheating yield carbon of different character from that obtained under the conditions already specified.

Gas Controllers or Regulators.

BLAKE, E. W., of South Croydon.

No. 14,973; June 26, 1909.

This gas controller or regulator is chiefly designed for use in connection with street-lamps, although also applicable for other purposes. In such controllers or regulators as hitherto made, the gas-valve is opened so as to turn on the supply to the burner by raising the pressure of the gas in the main to a certain predetermined point; the valve being closed so as to extinguish the gas by again raising the pressure of the gas in the main to the same pressure as that required for turning on the valve. A device has also been proposed in which it is possible to extinguish the gas without raising the pressure of the gas in the main to the high point required for turning on the gas; but this device is open to objections in practice, chiefly owing to the fact that it does not operate the gas-valve directly.



Blake's Gas-Lamp Lighting Regulator.

The device shown comprises an annular container A, partly filled with mercury, as indicated at B, and into which there dips an annular bell C. The upper part of the bell is provided with the inclined or curved neck D, and the upper part of the casing with an expanded channel E. F represents a series of balls placed around the neck of the bell and forming the load before referred to. G is the gas supply pipe, having three branches, two of which H pass up through the wall of the annular casing, while the third I extends through the centre of the annular bell C and projects beyond the upper end of it, which is fitted with the cock J. This cock is provided with a plug K formed with the gas-passages L, designed to place the gas supply pipe I in communication with the supply passage M in the cock casing. The cock is also provided with a passage connecting the pipe I with a passage communicating with a bye-pass burner. The plug K of the cock has fitted to it outside the casing the ratchet wheel N, with which engages the pawl O pivoted upon the arm P, which is itself pivoted axially with the cock plug. The arm engages with an eye or stirrup upon the upper end of a rod Q, the lower end of which is attached to the upper part of the annular gas-bell C. R is a detent, which prevents the backward movement of the ratchet wheel N. There are stops on a disc carried by the plug K and serving, when the plug is rotated, to support the bell C in a raised position by being interposed in the path of a catch carried by the bell.

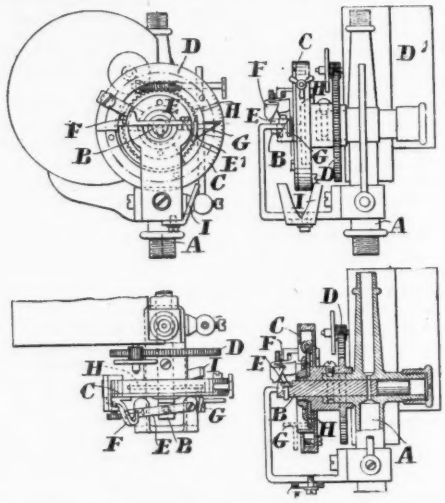
With this construction, when the pressure in the main has reached the predetermined point, the bell C is caused to rise, and as it rises the balls F slide by gravity down the neck and rest upon the channel E—thus relieving the bell of their weight. The upward movement of the bell actuates the pivoted pawl O, which turns the gas-valve so as to open it and permit gas to pass through the supply pipe I to the burner. On the fall of pressure in the main, the bell C drops, but is prevented from descending to the bottom of its stroke by contact of the catch with one of the stops carried by the cock K, which stop has been brought into the operative position by the movement of the cock when turned by the ascending bell. The bell is retained in this position until the pressure in the main is raised sufficiently to lift it from the supporting stop. This further upward movement again turns the gas-cock so as to extinguish the gas, and at the same time moves the supporting stop out of the path of the bell, which is therefore free to descend. As it nears the lower end of its stroke, the balls F again roll on to the inclined neck D, and thus reinstate the load, which prevents the bell from rising until the pressure in the main again reaches the predetermined higher point.

Automatically Establishing and Cutting Off the Supply of Gas.

HANSFORD, J., of New Barnet, and WRIGHT, J. F., of Witton, near Birmingham.

No. 15,086; June 28, 1909.

This apparatus (so arranged that the supply of gas will be automatically cut off and again established at predetermined times) is of the kind wherein the valve controlling the supply is operated by means of driven tappets, one or both of which is automatically adjustable so that the times at which the supply is cut off or established may be automatically varied according to the time of year.



Hansford and Wright's Automatic Lighting and Extinguishing Apparatus.

The supply duct A is opened and closed by a cylindrical plug cock B, on the projecting end of which the timing disc C and driving wheel D (operated by clockwork) are mounted to rotate, and which is shifted axially to open and close the supply duct by a lever E fulcrumed on the frame and coupled with the plug cock as by a pin and slot connection, and actuated by engagement with the timing tappets F G, which are arranged to shift the lever alternately in opposite directions.

One of the tappets F (usually the one which cuts off the supply) is mounted so as to be manually adjustable on the timing disc by means of a screw-clamp; while the other tappet G is mounted to rotate with a worm wheel H, freely mounted co-axially with the timing disc but carried round with the latter by engagement with a worm which is journalled upon the timing disc. The worm shaft carries a star wheel, which is arranged to encounter a normally fixed tappet I once in each revolution of the timing disc—thereby causing the tappet G to be shifted circumferentially on the timing disc a definite amount. The tappet is so arranged that it can be set to turn the worm in either direction—for example, by mounting it adjustably on the frame so that it may be set to engage the star-wheel on either side—whereby the tappet may be automatically advanced day by day during half the year and retracted during the other half.

The tappet F may (alternatively) be adapted to be adjusted automatically in the same manner as that described with reference to the tappet G. The timing disc may be driven by a motor actuated by the gas supply; and in this case it is necessary that the rate of flow of gas should be constant. An automatic pressure governor would have to be interposed between the supply pipe and the gas-motor, which would usually also be the gas-meter.

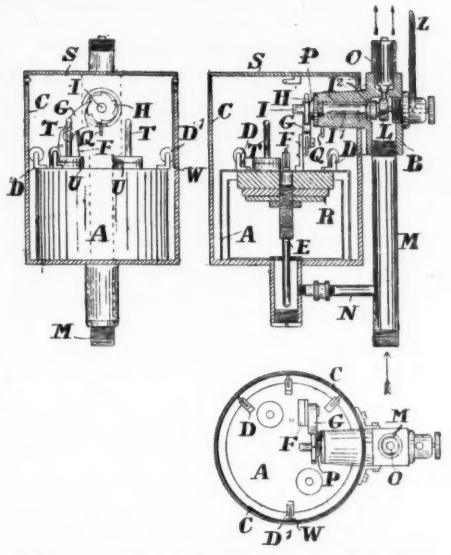
Pressure Controllers for Operating Gas Lighting Systems.

SPARKS, E., of Tufnell Park, N.

No. 22,805; Oct. 6, 1909.

This device for controlling gas-lighting systems by variation of the pressure in the mains, consists in inserting a lift-valve or plug-valve

in the direct path of an upright gas-way from main to burner; the gas-way being arranged parallel with the operating cylinder of the pressure controller.



Sparks' Pressure Controller for Gas Lighting Systems.

The controller utilizes a piston A, which is raised by the increased pressure of gas, which causes gas to alternately pass through the cock B or to be cut off. The piston is mounted in a cylinder C, and is preferably guided by rollers mounted on the piston and a central guide E. The piston carries at the top a bracket F, in which is mounted a spring-pressed pawl G, adapted to engage a ratchet wheel H mounted on a spindle I projecting into the cylinder C above the piston at right angles to the axis of the cylinder. The spindle passes through the cock and is provided with a cam-wheel L or ratchet-wheel arranged in the gas-pipe M. Gas passes from this pipe to under the piston through a branch pipe N.

The wheel with a number of cams L corresponding in number with half the number of teeth on the ratchet wheel H, is situated in the part of the cock-casing which is in line with the gas-pipe, and a cylindrical plug, with a conical point O, seated in the casing, is adapted to be lifted by the cams or ratchet teeth L provided for this purpose on the spindle I.

When the piston is lifted by an increased pressure of gas, the operating pawl G rotates the ratchet-wheel H one tooth; and this causes the spindle I to turn, and the conical plug valve O is raised from its seat, or, if raised, is allowed to return to its seat. In the first case, gas will be allowed to pass along the pipe M direct to the burner; and in the second case, the passage of gas will be cut off.

In order to avoid side-thrust and to steady the piston in its movements, the guide-rollers are arranged in such a way that three of the rollers D bear against the inside of the cylinder C on the same side as the pawl G and bracket F, and a single roller travels in a groove or slot W in the wall of the cylinder on the opposite side to the three-guide rollers.

The cock B, to which the upper and lower portions of the gas-pipe M are connected, passes through the cylinder C; the pipe being also preferably parallel with the axis of the piston and cylinder. In order to prevent leakage past the gas-cock, the spindle of it within the socket portion of the casing is made with a narrowed part, and there is interposed a coiled spring or spring washer P between the ratchet-wheel H and the outer extremity of the socket portion B—this spring serving to hold the shoulder of the spindle against a corresponding shoulder in the bearing for the spindle within the socket.

The piston is weighted by removable weights R, and it is provided with a mercury bath or seal into which it dips. A bye-pass pipe Z is shown. The top of the piston is also shown provided with studs or stems T upstanding from it; and upon these stems weights U may be fitted to secure a fine adjustment of the weight of the piston without having to alter the weights R on the underside of the piston.

Igniting and Extinguishing Gas-Burners.

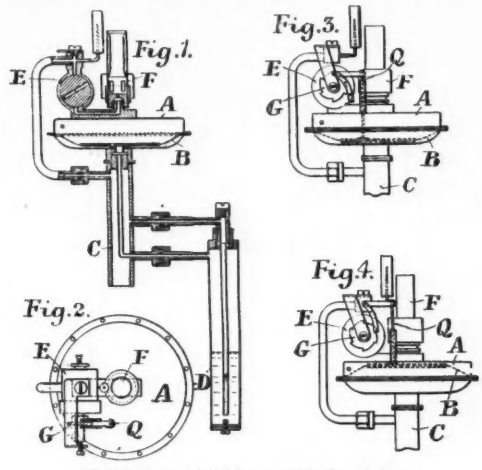
FORTI, V., of Paris.

No. 26,349; Nov. 13, 1909. Date claimed under International Convention, Nov. 14, 1908.

This invention relates to apparatus for automatically igniting and extinguishing gas-burners by producing an instantaneous excess of pressure in the main from which the system of pipes is supplied, or, if necessary, at the gas-works itself.

Fig. 1 is a vertical section through the mechanism applied to the burner; fig. 2 is a plan; fig. 3 is a side elevation of the parts in normal position; and fig. 4 shows the parts in position when there is an excess of pressure on the gas.

The mechanism comprises a chamber A in two parts bolted together and holding between them a flexible membrane B, fixed to a metallic disc of suitable weight. The chamber A is mounted on a vertical pipe C, attached at its lower end to the gas-supply pipe. From the pipe a branch terminates in a tube, open at its lower end and connected by its enlarged upper end with a closed cylinder D. The upper part of the cylinder is connected with a tube which opens into the chamber A beneath the membrane B. From the upper part of the pipe C springs a branch, which conveys the gas to the casing of the cock E. The plug of the cock has a bore at right angles to its axis; and its casing is connected with the bunsen burner F of the gas-lamp. There is also a small pipe terminating in a pilot-jet, which is constantly alight. The plug of the cock carries outside its casing a ratchet wheel G, with which engages a pawl, pivoted at its upper end to a bracket carried by a rod Q fixed on the disc of the membrane. The cylinder D contains a quantity (suitable for the gas pressure) of liquid—preferably glycerine.



Forti's Lamp Lighter and Extinguisher.

The parts of the apparatus being in position shown in figs. 1, 2, and 3, when the gas-lamp is out of use and the cock E is consequently closed, if pressure is produced in the pipes which terminate in the apparatus, the excess pressure overcomes that of the column of liquid in the cylinder D, and gas bubbles through the liquid and passes into the chamber A. The membrane B is thus lifted (fig. 4), and the rod Q is suddenly raised, so that a pawl (provided for the purpose) turns the ratchet G, and through it the cock E. The latter is thus brought into the position in which gas is supplied to the burner, and is ignited by the pilot-jet. A perforation in the chamber A above the membrane allows passage of air, so that free-movement of the membrane is not impeded. When the momentary excess pressure ceases, the glycerine in D rises again, and balances the normal pressure of the gas supply. The gas in the chamber A now escapes through the orifice in the cylinder D, so that the membrane falls again and the pawl descends ready to engage the next tooth of the ratchet G—the burner remaining alight. To extinguish the gas, another momentary excess pressure is produced, whereupon the membrane B is again lifted, and the plug of the cock turns into a position in which the cock is closed.

All the burners connected with the system of pipes are affected by each excess pressure put upon the gas, whether it is intended that the burners shall be extinguished at midnight or burnt throughout the night. A variation of the construction of the several cocks E provides the differentiation between burners on the system. The ratchet wheel G has always six teeth; and each excess pressure determines the rotation of the plug of the cock through 60 degrees—that is to say, the ratchet wheel turns through the angle comprised between two teeth.

Removing Tar from Coke-Oven Gas, Retort Gas, &c.

FABRY, R., of Sheffield,

No. 29,930; Dec. 22, 1909.

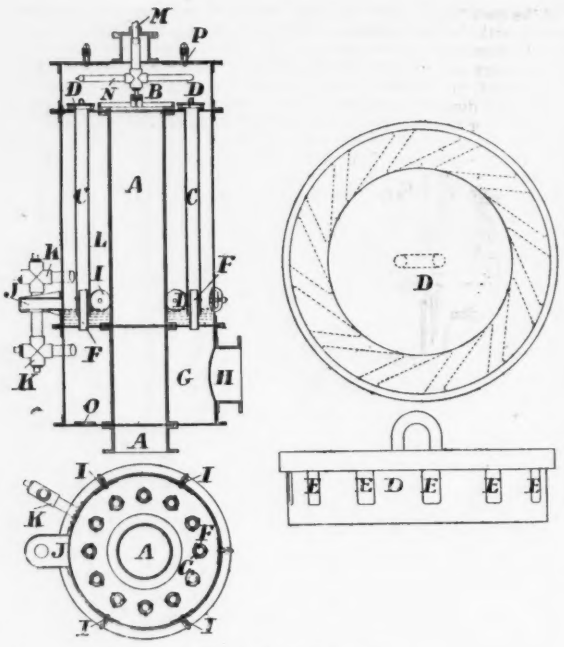
In this apparatus (see p. 272) centrifugal force is employed to free gas under treatment from the tar it contains; and it is characterized by the use of empty vertical tubes of small diameter—say, 5 inches or less—in which the gas is made to travel at high speed with a rotary or spiral motion.

The working of the tar-separator may be described as follows: The gases containing the tar in the form of finely-divided particles enter the separator by the vertical central pipe A, through which they reach the chamber B. From this chamber they penetrate into a series of empty vertical tubes C, each of which is covered by a cast-iron hood D. The hoods are each provided with twelve tangential conduits E, which constitute the only passage through which the gas can reach the tubes C. The total area of the conduits is such that a difference of 3 to 4 inches water pressure is required between the gas pressures at the inlet and at the outlet of the tar-separator in order to pass the quantity of gas for the treatment of which it has been designed. This difference of pressure is sufficient to impart to the gases the speed "necessary to obtain complete separation of the last traces of tar."

From the separating tubes C the gases pass through the smaller tubes F into the chamber G; and from there, through the connection H, to the other apparatus for different treatment. The separated tar flows down the sides of the tubes C into the tar-bath at the bottom of the chamber L, the height of which tar-bath is determined by the position of the tar outlet J.

A pipe connection K is provided between the chambers G and L, for the purpose of keeping the gas pressure equal in both chambers and so prevent any disturbance of the tar-bath in the bottom of the chamber L. Inspection holes I are provided so that the chamber L may be cleaned from time to time of solid matter accumulated therein.

When separating tar from hot gases, it is necessary to avoid the formation of any pitch in the apparatus. On the other hand, when separating tar from cold gases solid deposits of naphthalene are also liable to interfere with the good working of the tar-separator. For the purpose of preventing both these occurrences, a continuous flow of tar is admitted through the pipe M, and uniformly distributed by the rotating device N on top of the hoods D. The tar so admitted will



Fabry's Tar-Separator.

continuously flush the hoods and their conduits E, and maintains the latter free from pitch or naphthalene. This tar is also separated from the gas in exactly the same way as the tar originally contained in the gas; and all the tar eventually finds its way out of the separator through the outlet J.

An additional tar outlet O is provided at the bottom of the chamber G, so as to drain this chamber of any tar, water, or other liquid which may condense in the chamber or return to it from the gas-conduits.

In practice, such a tar-separator is built to deal with the maximum output of gas; but when the maximum is not to be treated, it becomes necessary to reduce the output of the separator accordingly, so that the gas may still pass into the separating tubes with the requisite speed. For the purpose of reducing or augmenting the output, manholes P are provided in its upper cover by means of which a suitable number of hoods D may be removed and replaced by a similar number of plain lids—thus putting the tubes so covered out of action and leaving the remaining tubes to work under the proper conditions of speed and pressure.

Generating Gas from Peat.

Astor, J. J., of New York.

No. 15,736; July 6, 1909. Date claimed under International Convention, May 10, 1909.

This invention relates to the manufacture of producer gas from peat. The main essential feature of it involves the disintegrating action on the peat caused by the expansion of the gas occluded in the peat or held within its pores and interstices. The patentee proposes to utilize the gas, or a portion of it, manufactured from the peat to operate an engine, and to utilize the exhaust gas from the engine for creating the alternate compression and rarefaction of the air and gas in the peat-chamber without coming into contact with the peat. To aid in the disrupting and disintegrating of the peat (to facilitate the production of the gas), he preferably mounts the engine within the base or beneath the producer, and supports the grate or floor of the peat-chamber on the engine-base, so that the jar and vibration of the engine will be communicated to the peat.

Production of Gas and Ammonia from Peat.

Lymn, A. H., of Bromley, Kent.

No. 17,074; July 22, 1909.

In ammonia recovery gas-producer plants, the patentee points out, it is found that when the fuel, like peat, contains a large percentage of moisture, the yield of ammonia and the quality of the gas are poor; and the object of his invention is to increase the yield of ammonia and simultaneously to improve the quality of the gas from peat containing a large percentage of water.

For this purpose, he passes into a gas-producer (of any usual form or construction) a mixture of air and steam in a highly superheated condition. He is aware that it has previously been proposed to utilize the sensible heat of the gases leaving the gas-producer to superheat the air and steam entering the gas-producer; but when using peat containing much moisture, it is found that the temperature of the gas leaving the producer is not high enough to superheat sufficiently the air and steam entering the gas-producer. He accordingly utilizes a portion of the gas generated in the producer—preferably after it has been treated for the recovery of ammonia and other bye-products—to superheat the air and steam. For this purpose, he burns some of the gas and applies the heat of combustion to superheat the mixture of air and steam on their way to the producer. The transmission of the heat of combustion to the mixture of air and steam may be effected by the usual means.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Vertical Retorts for Small Works.

Sir,—At the recent meeting of the European Gas Company, Mr. H. E. Jones is reported by you to have said (in answer to a shareholder) that vertical retorts were only suitable for very large works; that such a unit as a vertical retort would be in most of their works absolutely too clumsy; and that the Directors would like to have a little more knowledge of their success in different positions, &c.

It seems perfectly clear from this that Mr. Jones had not in his mind at the time he made this statement the Dessau system of vertical retorts; or, if he had, he cannot know how extensively they are being used in moderate-sized works. May I, therefore, be permitted to point out that this system of vertical retorts has emerged successfully from the experimental stage, and has now become an established mode of carbonizing. There are over 5000 retorts of this system in operation in various parts of the globe—comprising about fifty different towns and cities, varying in population from 20,000 upwards. Among these may be mentioned such places (small in comparison with the majority of the stations of the European Gas Company) as Aschaffenburg, Friburg, Jena, Berne, Brandenburg, and Nancy.

May I further add that many of these retorts have been in operation for four or five years, and that repeat orders have in several instances been received. They are, in fact, giving complete satisfaction as regards gas production, saving in labour, and durability. If Mr. Jones would like to make a personal inspection of this system at any time, I am quite sure the Dessau Company of Berlin would be very pleased to obtain for him facilities for doing so, either at Berlin, Dusseldorf, Cologne, Mariendorf, Duisburg, Magdeburg, Warsaw, Barcelona, Zurich, or elsewhere. If he prefers to stay at home, there is Sunderland, where I am sure Mr. Jones would be a welcome visitor.

C. Holmes Hunt, Secretary.
Vertical Gas-Retort Syndicate, Limited.

17, *Victoria Street, S.W., July* 21, 1910.

Automatic Gas-Lighters.

Sir,—On p. 199 in your last issue (Register of Patents), there appeared an abstract of the specification of an invention under the name of E. W. Blake, which purports to be an improved construction of the "Robson" automatic lighter; and the object of the invention is stated to be to provide apparatus which is to a certain extent self-regulating, so that the turning off of the gas at extinguishing time may be performed at a lower pressure than is required for turning on the gas at lighting time. Another object is stated to be to prevent unintentional variations of pressure in the main from operating the apparatus during lighting periods.

Had Mr. Blake taken the trouble to make himself acquainted with my invention, he might have spared himself the time spent on devising his so-called "improved construction" of my apparatus. Suffice it for me to say that I should at any time be pleased to show my apparatus performing successfully the two objects of his invention—moreover, without the aid of liquid seals, bells, or fancy valves; and I would also show him feats in automatic lighting which, I venture to think, are not "dreamt of in his philosophy."

39, *Victoria Street, S.W., July* 23, 1910. Geo. Robson.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: Middleton Corporation Bill.

Bill presented and read the first time: Wemyss and District Water Order Confirmation Bill.

Bills reported, without amendment: Montrose Water, &c., Order Confirmation Bill, Water Supplies (Protection) Bill.

Bills reported, with amendments: Bradford Corporation Bill, Fylde Water Board Bill, Middlesbrough Corporation Bill, Water Provisional Order Bill.

Bills read the third time and passed: Clydebank and District Water Order Confirmation Bill, Little Hulton Urban District Council Bill, Mountain Ash Water Bill, Paisley Gas Order Confirmation Bill, Shirebrook and District Gas Bill.

The Water Provisional Order Bill referred to above is to confirm an Order made by the Board of Trade in regard to the Sutton District Water Company, and it had been under the consideration of a Select Committee presided over by Lord Clinton. The object is to extend the area of the Company's supply so as to include the parish of Kingswood. The Bill had been opposed by the Kingswood Water Company, and a clause had been inserted requiring the Sutton Company, if requested, to acquire such of the mains of the Kingswood Company as might be used by them in carrying out their scheme. The Bill was considered by a Committee of the whole House on Thursday; and the report of the amendments was to be presented yesterday.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bill brought from the Lords, and read the first time: Paisley Gas Order Confirmation Bill.

Bill presented: Falkirk Corporation Gas Order Confirmation Bill.

Bills read a second time and committed: Abertillery and District

Water Board Bill [Lords], Gas Orders Confirmation Bills Nos. 1, 2, and 3 [Lords].

Bill read a second time: Paisley Gas Order Confirmation Bill [Lords].

Lords Bills reported: Gas Companies Standard Burner (No. 1) Bill, Gas Companies Standard Burner (No. 2) Bill, Gas Companies Standard Burner (No. 3) Bill, Gas Orders Confirmation Bill No. 2.

Bills read the third time and passed: Cambridge Water Bill [Lords], Clydebank and District Water Order Confirmation Bill [Lords], Gas Orders Confirmation Bill No. 2 [Lords], Havant Gas Bill [Lords], Middleton Corporation Bill.

The Gas Companies (Standard Burner) Bills came up for consideration yesterday; but they were all successively objected to, and were formally ordered to be put down for to-day.

GAS COMPANIES (STANDARD BURNER) BILLS.

Consideration of Clauses.

House of Commons Committee.—Monday, July 18.

(*Before Sir* HENRY KIMBER, *Chairman, Mr.* BALDWIN, *and Mr.* F. W. S. M'LAREN.)

The Committee having given their decision on the above Bills (see *ante*, p. 213), met this morning for the consideration of clauses.

Mr. RAM, on behalf of the opponents, asked the Committee to insert the following clause: "Any gas examiner appointed by the local authority or local authorities concerned may at any reasonable time test, at any prescribed testing-place, the illuminating power and purity of the gas supplied by any of the promoting companies." There was no such power at present; and the opponents considered it a reasonable request to make. Under the Gas-Works Clauses Act, the power to test was limited at present to certain hours, varying slightly according to the different times of the year. But when that Act was passed, there was practically no gas used for power and heating purposes; whereas it was now very great indeed.

Mr. FITZGERALD, on behalf of the promoters, submitted that because they were altering the test-burner there was no reason for altering the General Act of 1871, which regulated the testing of gas throughout the United Kingdom with the exception of London. What was proposed by the clause was done now by that Act—it enabled the gas to be tested at any reasonable time; and it fixed what a reasonable time was.

The CHAIRMAN: That was for illuminating power.

Mr. FITZGERALD agreed. He pointed out, however, that the proposed clause asked to do away with the provisions of the Act of 1871. Again, the words in the clause were "any reasonable time;" but the first point that would arise when a test was made would be, Was it "a reasonable time" or not? With ordinary gas companies, if the gas were tested on a Sunday about forenoon, it would almost certainly be found to be below the illuminating power, because there was no consumption and no circulation of gas in the neighbourhood. It was after considering these matters that, in 1871, Parliament fixed the hours when testing should take place. The only large case where these provisions had been changed was under the Special Act relating to the London Gas Companies. In that case, there was an entirely different code of provisions; and the companies were protected against the gas being tested unfairly. But the London provisions could not be applied all over the country. This proposal meant an alteration of the general Statute, which, if altered at all, should be altered by another General Statute.

Mr. RAM replied that they did not desire to insert in the Bills anything unfair. The conditions of these 43 gas companies were being altered. The Committee had heard in the evidence of the largely increased use of gas for power and heating. This had nothing to do with its actual use for light; but they were only asking for a test to be taken of the illuminating power and purity, because, given the illuminating power what it ought to be, the heating power would be approximate to what it should be.

The CHAIRMAN said that, supposing the Committee were, on behalf of Parliament, *de novo* settling the terms of the Gas-Works Clauses Act, or considering an amendment, it would not perhaps be an unreasonable thing to moot that there should be no limited hours for the gas examiners to do their work; but this was not the exact position at present. The Gas-Works Clauses Act of 1871 was general legislation. It was quite true that the present Bills, although promoted by the 43 companies, were a step, with regard to the burner, in general legislation; and to this extent it was perhaps an amendment of previous Acts. But the reason for this alteration or this differentiation between the 43 companies and the scores of other companies who had not got it, was put on the ground that the advance in science in gas illumination had shown the necessity and importance in the future of looking to the testing with regard to power and heat. The matter was daily becoming more important. But the Committee did not think that this was the time, or that it was for them, as a Parliamentary Committee sitting upon these particular Bills, to make this alteration; and they did not see their way to insert the clause.

Mr. RAM then proposed the following clause:

The promoting companies (each of whom is in this section called "the company") shall at any time within the period of twelve calendar months after the passing of this Act, if and when required by any consumer of the gas supplied by the company, supply and fix, free of charge to such consumer, a sufficient number of burners suitable in all respects for the consumption of the gas to be thereafter supplied by the company in the place of any burners (not being incandescent burners) used by such consumer at the passing of this Act. Notice of the provisions of this section shall be given on each demand note of the company sent out during the said period. The company shall, if required by any person who shall be supplied with gas by means of a prepayment meter, supply and fix free of charge in connection with such meter one incandescent burner with mantle and chimney in such position as such person may desire.

Such a provision was not without precedent; and it was particularly necessary with regard to the present case, because the evidence showed, and it was admitted, that, in consequence of the change in burner, there would be a distinct diminution of light with the flat-flame burners. This clause was inserted in the Alliance and Dublin Gas Act of last year, excepting that in that case the words "flat-flame burners" were used; and he was willing to insert these words in this clause. There was precisely the same clause in the Gaslight and Coke Company's Act of last year, with the exception that in London there was not the enactment with regard to prepayment meters. A provision of a similar nature was inserted in the Sheffield Order by the Board of Trade, at the instance of the Sheffield Corporation.

The CHAIRMAN: It is not in the Model Clauses, is it?

Mr. RAM replied that it was not. There were, however, several precedents other than those he had referred to.

Mr. FITZGERALD: Where this clause has been inserted, there has always been a reduction of candle power.

The CHAIRMAN asked whether the clause had been put in by agreement.

Mr. FRERE (the Parliamentary Agent for the petitioners) said that in the Sheffield case it was inserted against the will of the Company.

Mr. HONORATUS LLOYD pointed out that the clause was inserted by the Board of Trade and not by Parliament.

The CHAIRMAN remarked that the fact that the clause had been inserted did not cover the whole case, because, even supposing it was imposed upon them, it would have been upon the consideration of the whole of the particular circumstances, which the Committee had not got before them. In the consideration of these Bills, the Committee had had evidence from a medical gentleman from Liverpool with regard to the use of incandescent burners by the poorer classes; and by this clause the Committee were being asked to compensate differentially a portion of the poor as against another portion of the poor who were able, at all events, to afford incandescent burners.

Mr. RAM said he was proposing to deal only with the poor consumer who would be adversely affected by the charge. There were poor consumers who were using incandescent burners; but that was no reason why assistance should not be given to those who needed it. The very fact that this had been done by consent showed how absolutely reasonable it was; and in the cases where the clause had been inserted, the companies considered it a right and fair thing that justice should be done to poor people who were using an inadequate flat-flame burner. It had been proved that in many cases in Liverpool nothing but a flat-flame burner could be used; and it was with regard to these persons, who would be put to the expense of changing the burners at their own cost, that he asked for the clause.

Mr. HONORATUS LLOYD replied that there was no opposition with regard to the majority of the companies in the three Bills; and yet the clause was to be applied to them all. In asking for the clause, the opponents assumed that the poor people all used flat-flame burners, whereas the majority of them used incandescent burners. As to the precedent in the Alliance and Dublin Gas Bill, there were a number of questions discussed. The Company offered to accept the clause; and it was then inserted by agreement. In the case of the Gaslight and Coke Company, it was part of their own proposal that they should give the clause. They were reducing the illuminating power. As to Sheffield, the Company were seeking to reduce the candle power and alter the burner to the No. 2 argand; but the discussion on the matter was to the effect that they were asking to alter one of the cardinal points of the bargain—the actual candle power. It was under these circumstances that the earlier part of the clause that was now being asked for was inserted without discussion. There was not one of the cases where the only question was the change of burner; and, as a matter of fact, there was no such provision in the Model Bill. The clause itself was contradictory in asking for flat-flame burners for poor customers while it was common knowledge that most of the poor consumers had prepayment meters, and in that case they were asking for the incandescent burner.

The CHAIRMAN said this was, in fact, a form of compensation to some consumers and not to all. The Committee had decided against differentiation in passing the preamble of the Bill; and it was differentiation for a burner which was admitted to be defective. If the clause were allowed, it would be inserted against a large number of companies against whom there was no opposition and against whom it was not claimed; and it would be a variation of the general law.

Mr. RAM remarked that he would be content to limit the clause to the companies against whom there was opposition.

The Committee decided that the clause could not be inserted.

Mr. TALBOT then proposed a clause with regard to the provision of a testing-place by the Liverpool Company.

Mr. FITZGERALD agreed to accept this without discussion.

Mr. RAM asked the Committee to insert the following clause:

The Exeter Gaslight and Coke Company and the Southampton Gaslight and Coke Company shall, within three months after the passing of this Act, provide and maintain at the Municipal Offices of the Mayor, Aldermen, and Citizens of the City of Exeter, and the Mayor, Aldermen, and Burgesses of the Borough of Southampton (in this section called "the corporation"), or such other place as may be agreed with the corporation, a testing-place (which testing-place shall be a prescribed testing-place for the purposes of the Gas-Works Clauses Act, 1871), and all such apparatus as may be necessary for testing the illuminating power and purity of the gas supplied by them, and the corporation shall provide a suitable room for the purpose.

The Committee had heard, Counsel said, of the variation which took place as to the quality of the gas; and it was necessary, in regard to these two Corporations, that there should be testing-places on their premises.

Mr. FITZGERALD contended that the testing-place was invariably fixed by the Special Act; and in each of these cases, a suitable testing-place had been fixed, and the gas had been tested there for years without complaint. Under these circumstances, there was no reason whatever why Exeter and Southampton should be selected out of the 43 companies because of the improved form of the burner.

Mr. RAM said that, in the great majority of the companies in the Bills, they had already got what was being asked for in the clause; so that there was no question of selection.

The Committee decided not to allow the clause.

Mr. TALBOT, on behalf of the Bournemouth Corporation, asked the

Committee to repeal the proviso to section 19 of the Bournemouth Gas and Water Act, 1896, which required the Corporation to give the Company two hours' previous notice before conducting the tests. He said that, with such a notice, the Company had the opportunity of enriching the gas so as to enable them to pass the test; and the purpose of testing was defeated.

The CHAIRMAN: That is a suggestion of possible foul play?

Mr. TALBOT: I do not think it is foul play.

The CHAIRMAN: Unfair play?

Mr. TALBOT said that if the Company thought the gas was going to be tested in two hours' time, they would naturally give instructions to their officers for the gas to be properly kept up. The provision was obviously capable of this being done. He did not know what other object was served by two hours' notice. It might be said that this had nothing to do with the burner; but whenever a gas company came to Parliament for statutory powers for any purpose, that was always the opportunity of the local authority to ask for a re-adjustment of the statutory provisions. And the objection to the promotion of a Bill in this form by so many companies tended to deprive each individual corporation or local authority of the power of doing that which it undoubtedly would do if there was a separate Bill promoted by each company.

The CHAIRMAN remarked that Mr. Honoratus Lloyd need not reply. In many Acts notice had been required; and he did not see that a case was made out against the Bournemouth Company, or that they should have taken from them that which they had enjoyed the last 14 years, without doing wrong.

Later in the day, the clauses were finally adjusted; and the Bills were ordered to be reported to the House.

WARRINGTON CORPORATION AND STAND-BY CHARGES.

Clauses Granted in the Bill.

The Local Legislation Committee of the House of Commons have had before them the Bill promoted by the Warrington Corporation, which deals, among other things, with the gas and electricity undertakings. When the clauses were being considered,

Mr. WEDDERBURN, who appeared for the promoters, explained that the object of clause 17 was to enable a reduction of price in various outside districts. The comment of the Local Government Board was "An application was made to the Board last session for a Provisional Order to effect, among other things, the alteration in the Act of 1877 proposed by this clause. The Board were prepared to entertain the proposal so far as it related to the repeal of the minimum additional charges for the supply of gas outside the borough. The application was, however, withdrawn in consequence of the Board's decision on other matters. The promoters had met the Local Government Board on this point.

The clause was then passed. Clause 18, with regard to bye-laws as to gas-fittings, &c., clause 19, as to the laying of telegraphic and telephonic apparatus, and clause 22, as to the construction and placing of pipes, &c., between mains and meters, were withdrawn. Clause 20, saving as to penalties, and clause 21, power to lay gas-pipes in streets not dedicated to public use, were passed without discussion. Clause 23, gas consumers to give notice to the Corporation before removing, and clause 24, notice to discontinue supply of gas, were also passed. Some discussion arose upon clauses 25 and 26, however.

Clause 25 provides:

> Where any person has a supply of gas laid on by the Corporation to any premises for which he has at the same time a supply of gas from an installation other than that of the Corporation, the Corporation shall be entitled to receive from him, as a standing charge in addition to the price of the gas actually supplied to him, a fixed sum to be determined by them, not exceeding £5 per annum: Provided always that, in determining such fixed sum, the Corporation shall have regard to the probable maximum supply of gas which might at any time be required for such premises, and provided also that the Corporation shall not be entitled to any such standing charge as aforesaid in respect of any premises for which the whole supply of gas is afforded by them through a meter having a nominal capacity of less than ten lights.

Clause 26 provides:

> Where any person has a supply of gas laid on by the Corporation to any premises for which he has at the same time a supply of electricity, either from the Corporation or from an installation other than that of the Corporation, the Corporation shall be entitled to charge and receive from him in respect of the supply of gas so laid on such minimum sum as shall be fixed by them not exceeding 25s. for any one quarter of a year, notwithstanding that the ordinary charge for the gas actually consumed in such quarter would amount to a lower sum. Provided always that in fixing the amount of such minimum charge the Corporation shall have regard to the probable maximum supply of gas which might at any time be required for such premises: Provided, also, that, in respect of any premises for which the whole supply of gas afforded by the Corporation is taken through a meter having a nominal capacity of less than ten lights, and the supply of electricity is taken from the Corporation, no such minimum charge shall be made; and provided, also, that, in respect of any premises for which the whole supply of gas afforded by the Corporation is taken through such a meter as aforesaid, and the supply of electricity is obtained from an installation other than that of the Corporation, the amount of the minimum charge shall not exceed 5s. for any one quarter of a year.

On these clauses, the Home Office made the following report: "The Secretary of State observes that these two clauses follow provisions which were allowed last year to Heywood. But these provisions were adapted to somewhat special circumstances; and the Secretary of State suggests, for the consideration of the Committee, that if any provisions to the effect proposed were allowed to Warrington, it would be better, in the absence of any special reason to the contrary, that the two clauses should be combined and re-drafted on the lines of the provision allowed to Mountain Ash last year, and in the Rhondda Urban District Council Bill of the present session. That provision is based on the form which was settled by the Police and Sanitary Committees in regard to the supply of electricity in cases where the consumer has a separate supply, and which is now part of the general law; and its requirements appear to the Secretary of State to be more suitable for adoption generally than the special provisions in the Heywood Act."

The Local Government Board reported: "These are exceptional provisions in regard to the supply of gas; but clauses on the subject were allowed by the Local Legislation Committee, on evidence. The Committee, however, will no doubt require to be satisfied that the clauses might properly be allowed in the circumstances of this borough."

Mr. *J. L. Whittle*, the Town Clerk of Warrington, said the object of the clauses was to make a manufacturer who had the Corporation pipes laid on to his premises, and at the same time had an acetylene installation of his own, pay a minimum charge. They had many cases of people who provided themselves with a separate supply, and still wished to retain the use of the Corporation pipes in case of a breakdown. The manufacturers of Warrington had considered the clauses, and agreed they were reasonable. There was no objection at all.

Mr. WEDDERBURN called attention to the clause given in the case of Mountain Ash, which provided that: "Notwithstanding anything contained in the Gas-Works Clauses Act, 1871, or any other Act, a person shall not be entitled to demand from the Council a supply, or continuance of a supply, of gas for premises having a separate supply—that is to say, a supply from an installation other than that of the Council—unless he shall previously have agreed to pay the Council such minimum annual sum as will give to them a reasonable return on the capital expenditure and standing charges incurred by them to meet the possible maximum demand for those premises, and the minimum annual sum to be so paid shall be determined, in default of agreement, by arbitration in manner provided by the Arbitration Act, 1889." Counsel contended that the objection to this clause was that it applied only to gas, and it might involve the Corporation in many arbitrations. On this ground, Warrington preferred the Heywood clause.

The CHAIRMAN (Sir Francis Layland-Barratt) said that, under that clause, they might be able to make a very big charge on certain manufacturers. It was not limited in Mountain Ash. His opinion was that Warrington stood in the same position as Heywood; and therefore the clauses would stand.

Mr. BAKER (the Parliamentary Agent for the Bill) said that, in clause 25, the amount was fixed not exceeding £5 per annum; whereas in clause 26, it was a fixed sum not exceeding 25s. for any one quarter of the year. He asked whether it would be better to make them similar. If it was £5 per annum, and the tenant left towards the end of the year, they might possibly lose the £5; and under the other clause, they would get the previous three quarters of the year.

The CHAIRMAN said it was a mere drafting amendment; and they should have the £5 altered to 25s. per quarter.

Clauses 25 and 26 were then added to the Bill, as also were clause 27, which gives power to require the use of anti-fluctuators for gas-engines, and clause 28, which deals with the period of error in defective meters.

Bland Light Syndicate, Limited.

The Chairman (Mr. C. W. Bland), in submitting at the meeting the accounts for the twelve months ending April 30 last, congratulated the shareholders on the results of the year's trading. The business, he remarked, showed a steady increase all round. An interim dividend at the rate of 10 per cent. per annum for the six months ending Oct. 31, 1909, was paid in January; and the Directors recommended a further distribution at the rate of 20 per cent. per annum—making a dividend of 15 per cent. for the year. It appeared from the accounts that the distribution of this dividend still enabled the Directors to carry forward a sum equal to a substantial dividend on the Company's issued capital. The whole of the amounts brought forward on account of the preliminary expenses, advertising, and goodwill had been written off out of the profits. The continuous expansion of the Company's business was being maintained; and the further increase anticipated in last year's report had been fully realized. Meanwhile, the returns for this year to date showed considerable improvement over the corresponding period of last year.

Electric Lighting Scheme for Dundalk.

Mr. A. W. Trotter, the Electrical Adviser to the Board of Trade, has held an inquiry at Dundalk into objections which had been raised to a proposed scheme of electric lighting. In the course of the proceedings, Mr. Matheson, K.C., who appeared for the Dundalk Gas Company, pointed out that the scheme as originally propounded provided for 11 miles of overhead wires. Now it was proposed to have 9 miles of overhead wires and underground wires through the main thoroughfares. The gas-pipes, which were laid through practically all the streets of the town, owing to the nature of the soil, suffered considerably from corrosion. It was proposed to lay the electric cables direct in the soil with a warning board above them. Under these circumstances, if the electricity escaped it would be likely to set up electrolysis such as had occurred in Belfast recently (*ante*, p. 122). The result would be disastrous to the Gas Company, and would be of considerable danger to the public. The crossing of the streets with the overhead wires would also be dangerous. Evidence in support of this statement was given by Mr. George Airth, the Gas Manager, and Mr. Porte, Demonstrator of Physics to the Royal College of Science in Ireland. On behalf of a number of ratepayers, Mr. Donaldson also contended that the scheme as put forward would be unsightly and dangerous; but the Council urged that they had adopted the specifications of the Board of Trade, and that similar schemes were in operation elsewhere.

Tottenham and Edmonton Gas Company.—After carrying £1000 to the insurance fund, the amount to the credit of net revenue account for the past six months is £39,320. The Directors recommend full statutory dividends of 7 per cent. per annum on the "A" stock and 5½ per cent. on the "B" stock, carrying forward £23,154. A year ago the dividends were at the rate of 6⅞ and 5⅜ per cent. respectively; and the amount carried forward was £18,592.

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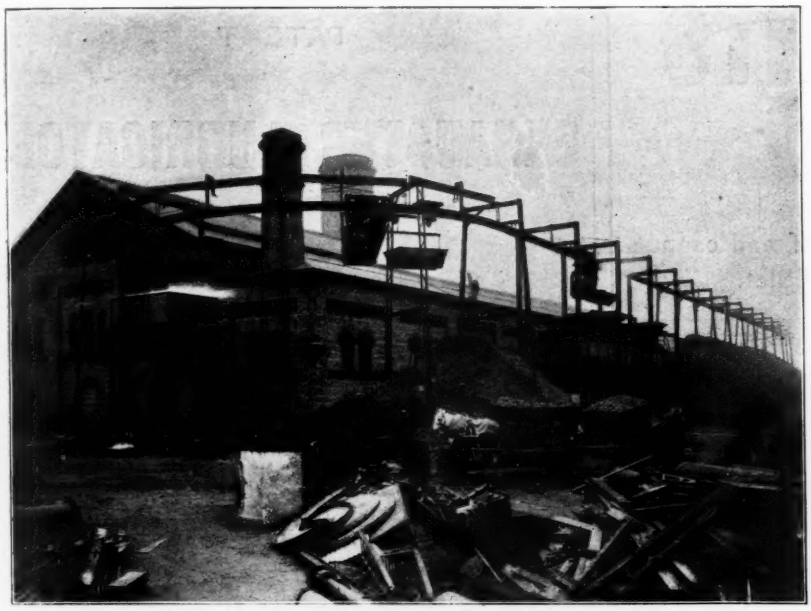

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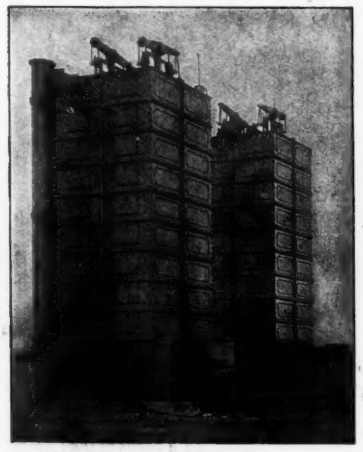

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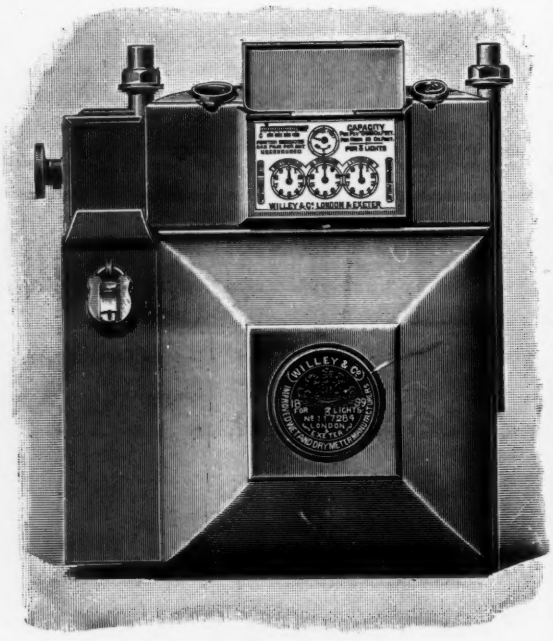

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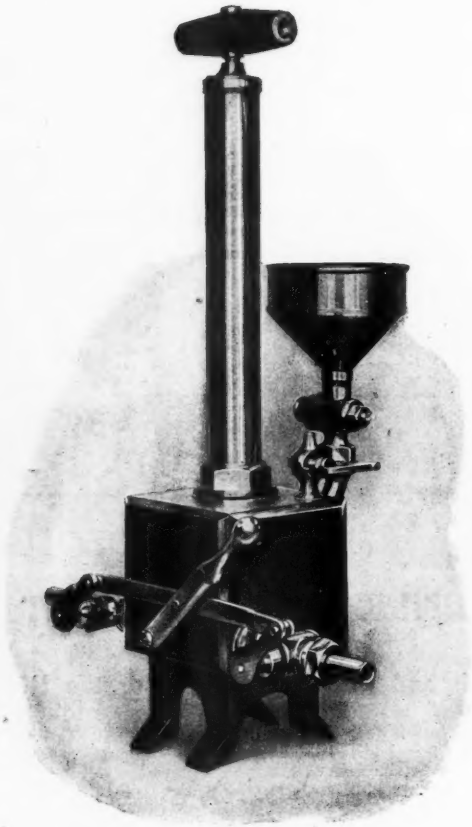

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LEGAL INTELLIGENCE.

ACTIONS BY DEBENTURE-HOLDERS IN GAS COMPANIES.

Last Tuesday, Mr. Justice Joyce had before him, in the Chancery Division of the High Court of Justice, actions by debenture-holders in two gas companies.

Bucks and Oxon District Gas and Coke Company, Limited.

An action brought by Mr. Eveleigh against this Company came before his Lordship on a motion for judgment upon agreed minutes. For the plaintiff, who sued on behalf of himself and the several other holders of debentures, Mr. Ward Coldridge asked for the usual declaration of charge, an inquiry as to what the property charged by the debentures consisted of and in whom it was vested, an account of the trust estate, and an inquiry as to what other incumbrances there were on the property. His Lordship made an order in the agreed terms.

Cobham Gas Company.

An action brought by Mr. Fitter against this Company came before his Lordship on a motion for judgment in default of defence. The plaintiff was represented by Mr. Wright. The Company was incorporated in 1899, and had issued certain debentures, of which the plaintiff held several. Lately a Receiver was appointed of the assets of the Company, except the uncalled capital. There was no appearance on behalf of the Company; and his Lordship made the usual order in a debenture-holders' action.

North Sussex Gas and Water Company.

Last Friday, before Mr. Justice Swinfen Eady, Mr. Patrick Hastings, instructed by Mr. Matthew J. Jarvis, of Finsbury Square, moved, on behalf of Miss Lomax, suing on behalf of herself and all other debenture-holders in the above-named Company, for the appointment of a Receiver. He said the Company had not put in any defence. It was a statutory concern, incorporated in 1905, and by section 11 the non-payment of interest was specifically made a ground for an application for a Receiver. The plaintiff was the holder of debentures to the amount of £1000, on which six months' interest was due and unpaid. It also appeared that judgment had been obtained and execution levied on the premises of the Company. His Lordship appointed Mr. Alfred W. Lunt, of Heathfield, Sussex, as Receiver, on giving security.

National Air Gas Company, Limited.

Last Friday the debenture-holders' action of Crewdson against the above-named Company was again mentioned to Mr. Justice Parker. Mr. Romer, K.C., reminded his Lordship that a Receiver and Manager had been appointed with the view of protecting the assets. The Company were now willing that the appointment should be continued over the Long Vacation. His Lordship ordered the motion to stand over until the second motion day in Michaelmas term; the Receiver and Manager to be continued, and to give security forthwith.

West Ham Corporation Finances.

In the Chancery Division of the High Court, on Monday of last week, judgment was reserved by Mr. Justice Neville in an action brought by the Attorney-General at the instance of large ratepayers of West Ham who questioned the legality of an overdraft of £150,000 obtained by the West Ham Corporation from the London and County Banking Company, Limited, for their electrical undertaking. It was alleged by the Attorney-General that the Corporation had exhausted their borrowing powers for electricity purposes, and had, in utter disregard of the limitations and restrictions of their Statute, obtained illegal advances on overdraft, resulting in reckless extravagance, and considerably enhancing the liability of the ratepayers. An order was also sought for repayment by the bank of interest paid to them in respect of these alleged illegal borrowings; but this part of the case was settled by the bank, without admitting liability, agreeing to repay £7000, with costs.

An Alleged Infringement of Design.

Last Friday, in the Chancery Division of the High Court, before Mr. Justice Parker, the plaintiffs in the action of William Cross and Sons *v.* Sydenham and M'Oustra, Limited, moved for interim relief in respect of an alleged infringement of their registered design for gas boiling-stoves. Mr. Sebastian, who represented them, however, stated that the parties had come to terms. The plaintiffs, he added, were carrying on business at West Bromwich as makers of gas boiling-stoves; and the defendants were at Walsall. Mr. Gray, on behalf of the defendants, consented to treat the motion as the trial of the action, to give a perpetual undertaking not to infringe the plaintiffs' registered design, to deliver up all stoves made in accordance with the design, and to pay £40 as agreed damages and costs. His Lordship made an order in these terms.

Control of Outside Lamps and Signs.—At the meeting of the London County Council last Tuesday, the Building Acts Committee reported that they had had under consideration the question of the control of lamps, signs, and other structures projecting from the fronts, or erected in advance, of buildings; and they recommended that legislation should be promoted next session with a view to provision being made for the regulation and control of such lamps, &c., not being architectural decorations within the meaning of section 73 of the London Building Act, 1894.

MISCELLANEOUS NEWS.

INSPECTION OF GAS LIQUOR AND OTHER WORKS UNDER THE ALKALI ACT.

District Inspectors' Reports.

In a preceding issue of the "JOURNAL," the report of the Chief Inspector under the Alkali Works Act, 1906, for the past year was dealt with. To-day we give some extracts from the reports of the District Inspectors.

The first district is Ireland, which is under the supervision of Mr. E. G. Ballard. He says that, with one exception, there was no reason to complain of the way in which the manufacture of sulphate of ammonia was conducted during the past year. At the works referred to, considerable negligence was displayed, and the matter was the subject of much correspondence with the Chief Inspector. On the assurance of more care being taken in future to prevent the escape of noxious gases into the atmosphere, no steps were taken to recover any penalty for infraction of the Act. The number of works using the continuous system of distillation is 33, and six use the intermittent system; the proportion of total liquor distilled by the two methods being 99·1 and 0·9 per cent. respectively. Products equivalent to 3021 tons of sulphate of ammonia were made during the year. There are a few places in the district where tar is distilled; but the majority of the works are those in which roofing felt is manufactured, and in these provision is made for dealing with the vapours. In the case of the other class, the sulphuretted hydrogen evolved at certain stages of the distillation is either burnt or absorbed in oxide of iron.

In the North of England district, which is under the supervision of Mr. E. Morley Fletcher, the number of works registered is 153, and the number of processes inspected last year was 201. All the works in the district were visited, and 546 tests were made of the gases evolved during the various processes. An increased quantity of sulphate of ammonia was made, owing to the extension of coke-ovens with recovery of bye-products; but no new works were registered. The total quantity of liquor distilled was equivalent to 46,687 tons of sulphate, and 99·8 per cent. was made by the continuous process. Mr. Fletcher says that when oxide of iron is used for arresting the sulphuretted hydrogen in the effluent gases, this in the form of a heap, instead of enclosed in a brick purifier, is becoming fairly general. The former method he considers preferable, certainly in the case of small works, as there the supervision is not always so good as in the larger ones, and escapes of sulphuretted hydrogen up the sides of the brick wall and through cracks in the brickwork itself are frequently left unnoticed, whereas any escape from the heap is quickly seen and remedied.

Reporting upon the district comprising Cheshire, North Wales, and part of Lancashire, Mr. E. G. Ballard states that 22 processes for the manufacture of sulphate and muriate of ammonia were under inspection during the past year. With one exception, he had no reason to complain of the way in which they were carried on; but at the works referred to, there was evident neglect on the part of the foreman in charge. Representations were made by the Chief Inspector, and no further infractions afterwards occurred. The various plants were kept in a good state of repair, and the manufacturers did all they could to meet the requirements of the Act. At all the works in the district the ammonia stills are on the continuous principle of distillation; the number of such stills being 22. The methods by which the sulphuretted hydrogen evolved in the process of manufacture is dealt with at the various works in the district are as follows: By the Claus process, 2; by absorption in oxide of iron, 18; by special process, 1. The proportion of sulphuretted hydrogen treated by the above processes, in terms of sulphate of ammonia made and per cent. of total liquor distilled, is as follows: By the Claus process, 7·5; by absorption in oxide of iron, 51·5; precipitated by metallic salts, 41.

In the district comprising Widnes, Runcorn, and Liverpool, which is under the supervision of Mr. Herbert Porter, the number of works dealing with gas liquor and sulphate and muriate of ammonia was increased by one last year; and all the plant was properly worked and maintained. This remark applies also to tar-works, of which there are six in the district.

The district of North and East Lancashire, which includes part of Yorkshire, is under the supervision of Mr. J. W. Young, B.Sc. To the gas liquor and other works 226 visits were paid last year. The proportion of liquor distilled by the continuous process was 90·8 per cent., and to liquor ammonia 7·3 per cent. Regarding the mode of destruction of the foul gas evolved, 34·4 per cent. of the total manufacture was in connection with sulphuric acid plants, 23·9 per cent. with Claus plants, 39·6 per cent. with oxide of iron purifiers, and 2·1 per cent. with other methods. Mr. Young says the first was entirely satisfactory, and some of the Claus plants worked very well; but at others better supervision is needed, both to avoid nuisance and to improve the quality of sulphur obtained. There were occasions when it was necessary to recommend an immediate change of oxide purifiers, owing to incipient foulness. Moreover, in some cases the walls of the boxes were not impervious to leakage of gas; but in all of the works advice was promptly taken. In a few instances box purifiers were abandoned for the heap system, with ultimate satisfaction; and Mr. Young says it is to be hoped this example will be more generally followed, as there still remain in this district purifiers with walls dangerously high. At three important works serious representations had to be made, because, although with more than one purifier in use, the parties disregarded the Chief Inspector's warning to provide hydraulic change-valves. Two promptly made the necessary alteration; but at the other, considerable pressure had to be exercised before the object was attained. At one works, much trouble had been given before it was possible to secure even a moderate amount of reform. The Inspector found "an ignorant attendant, a leaking saturator, a most inadequate purifier, and no condenser to cool the hot foul gases." The three latter have been cured; but as to the former, it is stated that "there is room for doubt."

At one works the purifiers were, on one visit, being used as a receptacle for lumber; thus obstructing the performance of their proper functions and the inspection of their condition.

In this district there are 25 tar-distilling works, most of which were found in good order and well conducted, though Mr. Young says more care is required to keep the receiver at the worm-end closed. At two of the works, the stills were found operating without any provision for leading away the foul gas from the receiver. The cause for complaint was at once removed at the former works; but at the latter there was so much unnecessary delay in carrying out the requirements of the Act that a crisis was only narrowly averted. At one works where there is a range of five stills, the foul gases from the receivers were formerly draughted together to one fire for destruction. Now each still separately destroys its own gas at its own fire. The change gives greater safety, and there is less likelihood of nuisance.

The total number of processes under inspection in sulphate of ammonia and gas-liquor works in the East Midland district, which is under the supervision of Mr. R. D. Littlefield, is 56, of which 49 are sulphate and muriate of ammonia works and the rest liquor works. Two additional sulphate works were registered during the year; bringing up the number to 48, of which 46 use the continuous and two the intermittent process. The proportion of liquor distilled by the former process last year amounted to 99·5 per cent. of the total. The sulphuretted hydrogen evolved is dealt with mostly by oxide purification and combustion.

In the South Midland and Norfolk district, which is under the supervision of Mr. Edward Jackson, there are 104 works where ammonium sulphate, chloride, or carbonate is manufactured or gas liquor concentrated; the number of such processes under inspection amounting to 114. In the year 1884, when the South Midland district was formed, out of a total of 112 registered works only 23 manufactured sulphate of ammonia. Four new works were registered last year for sulphate of ammonia manufacture. At two of them, which are plants at ordinary gas-works—continuous stills with the usual hand-fishing saturators were put down, with water-cooled iron pipe condensers. In the first case, a brick-walled oxide of iron purifier was attached; the bricks being laid in cement, as usual and necessary. At the other works, two oxide of iron heaps, with hydraulic change-valves, were arranged. The fourth new sulphate works registered were in connection with a power-gas plant of large dimensions, and was of the usual kind. There are now in the district five plants of the Mond or Duff type, where sulphate of ammonia is manufactured; also 19 where it is produced in connection with patent coke-ovens. At two works where retorts were used (so-called coal-carbonizing works), patent coke-ovens were substituted for them—in one case entirely, and in the other partially. There are only two of these carbonizing plants now in operation in the district; whereas at one time there were six. The remainder of the gas liquor distilled is from ordinary gas-works. There was again a considerable increase in the quantity of ammoniacal liquor produced in the district from other sources than the gas-works, such as coke-ovens, producer-gas plant, iron-works, and coal-carbonizing works. This is shown by the following figures, giving the proportion of liquor produced on a sulphate of ammonia basis:—

	1908. Per Cent.		1909. Per Cent.
From gas-works	61·2	..	54·9
,, coke-ovens	27·9	..	34·0
,, producer-gas plant	4·0	..	6·9
,, iron-works	2·9	..	2·8
,, coal-carbonizing works	4·0	..	1·4

It will be seen that 45 per cent. of the ammoniacal liquor now produced in the district is from sources other than ordinary gas-works. Five years ago (1904), this figure was only 7·9 per cent. of the total. Out of a 9·9 per cent. increase in the amount of sulphate of ammonia produced during 1909 over the year 1908, coke-ovens are responsible for 9·4 per cent. of it—*i.e.*, 95 per cent. of the increased production of sulphate last year was due to coke-ovens. The number of works using the continuous method of distillation in this district last year was 98; and the proportion of liquor distilled was 99·9 per cent.

Associated with Dr. Alfred C. Fryer in the supervision of the South and South-West of England District is Dr. Bailey; and all the works were visited and reported upon during the year by one or the other of these gentlemen. The number of visits paid was 836, and of tests made 713. There were 95 works registered for the manufacture of sulphate and muriate of ammonia. Dr. Fryer records that an interesting experiment is being carried out at a small gas-works in the South of England. The method is based on bubbling the gas through sulphuric acid, and then evaporating down with a steam-coil to obtain the sulphate of ammonia. Should this plan be found to work successfully and economically, he says a boon will be conferred upon those smaller works where considerable difficulty is experienced in the disposal of the ammoniacal liquor. They are not allowed to run it into the streams, and they are frequently situated at long distances from manufacturers who might otherwise buy it from them. Early in the year, two men were "gassed" at one works; and the circumstances pointed to the possibility that the men suffered from the effects of hydrocyanic acid. Suggested improvements have been made with the view of obviating any possible repetition of such an occurrence. The disposal of sulphuretted hydrogen by combustion and subsequent neutralization of the acid products is in use at three works. The number of works using continuous distillation plants is 72; the proportion of liquor treated by this method being 95·2 per cent. Oxide of iron purification was in use in 86 works last year.

Mr. F. Napier Sutton makes some interesting observations in his report on the district comprising the eastern and south-eastern counties, in which there are 11 alkali works and 171 scheduled and registered works. The distillation of gas liquor, either for concentration or the manufacture of ammoniacal compounds, is carried on at 89 works; and 94 manufacturing operations are under supervision. The products manufactured consist chiefly of sulphate; but they include carbonate and nitrate of ammonia, and liquid (concentrated and refined) and anhydrous ammonia. The gas-works in the district produced 89·3 per cent. of the products; and the balance came from the works of private firms. The total quantity of ammonia compounds made in the district last year showed a small reduction on the previous year's total. The number of works using continuous distillation plants was 82; and the proportion of liquor treated was 98·9 per cent.

The direct utilization of the sulphuretted hydrogen in the saturator gases for sulphuric acid manufacture is carried on at three works; the proportion of gas thus utilized being 55·5 per cent. of the whole. Mr. Sutton points out that great care is necessary to free the saturator gases from naphthalene and other oily hydrocarbons and ammonia before passing to the burners, if nitre consumption is to be kept down. Special attention in this direction was given at two of the works in his district. The Claus sulphur-recovery process has been adopted at works where hitherto, on account of their very isolated position and other peculiar conditions, the foul gases had been burnt in a special furnace. The process is now in use at ten works, and 23·8 per cent. of the gas is thus dealt with. Special difficulties exist at one works in dealing with the waste gases leaving the depositing chambers, as the latter have insufficient area and cannot be extended. The fine undeposited sulphur carried forward repeatedly blocked the terminal limestone tower and purifier, and as a substitute for these the exit gases are now to be passed to a fire.

Absorption of the foul gases by oxide of iron is used at 60 works, and it accounts for 9·2 per cent. of the gases. The use of oxide-heap purifiers in place of open box purifiers continues to increase in popularity. This method was adopted in August, 1908, in place of the Claus process, at one large works where the annual make of sulphate is 800 to 900 tons, and the daily make from 5 to 6 tons. A careful account has since been kept of the cost of this method of purification; and by the courtesy of the engineer and manager, Mr. Sutton is able to give the cost, which works out at 5·96d. per ton of sulphate made.

Treatment of the saturator gases by combustion and subsequent neutralization of the acid products in limestone scrubbers remains in use at 11 works; and the proportion of gas treated is 10·3 per cent. At two works the saturator gases continue to be passed to the coal-gas purifying plant. The crude method of burning the gases in retort or boiler fires is only now in existence at two works. One is a small establishment producing only 10 tons of sulphate by an intermittent plant; at the other works, bone charcoal liquor is distilled, and the saturator gases contain only traces of sulphuretted hydrogen.

Mr. Sutton directs the attention of manufacturers to the desirability of adopting a continuous lime-feed to the stills; the loss of ammonia by the wasteful method of intermittent liming being considerable. The addition of lime is frequently made at the smaller works by hand pumping at intervals nominally of 15 minutes, but frequently of 20 and 30 minutes; and it results in corresponding intervals of waste of fixed ammonia salts. At most of the large works, continuous lime-feed is now used; and Mr. Sutton says there is no reason why the principle should not be adopted in every case, with advantage to the yield and improvement in the character of the effluent. A little thought and ingenuity will overcome the problem.

This leads to another matter closely connected therewith; and Mr. Sutton proceeds to deal with it. He says that the varying quantity of lime used at different works is remarkable; and on examining the reason for this, it is obvious that it is a question of the character and quality of the lime employed rather than variations in the character of the ammoniacal liquors treated. Considerable excess of lime is necessary (usually 30 to 50 per cent. beyond the theoretical quantity needed) if the ammoniacal liquor is to be thoroughly decomposed. Chalk limes are mostly used in his district, and they differ much in quality, for some are badly burnt and are therefore low in causticity, while others contain a high proportion of silicious matter; or a lime may be poor for both reasons. A limestone lime, such as that obtained from Derbyshire, is very free from silicious or other inert matter, and when well burnt contains from 93 to 95 per cent. of caustic lime (CaO), against 85 to 88 per cent. found in well-burnt chalk lime. The absence of silicious matter in limes is important, not only because the causticity is affected thereby, but because the amount of fine flinty and earthy matter blocks the trays and seals of the stills, and quickly fills up the spent liquor settling-pits, besides injuring the pumps.

Mr. Sutton points out that the necessity of clearing the still trays which have blocked with solid matter and the cost of frequently removing the sludge from the settling-pits has led a few manufacturers to use caustic soda in place of milk of lime for decomposing the fixed ammonia salts. Caustic soda is a soluble alkali, and the sodium compounds formed on decomposition of the salts are likewise soluble; hence the stills may run for years without cleaning, and the effluent contains no solid matter requiring settlement and removal. The initial cost of caustic soda as against lime is much greater (70 to 72 per cent. Na_2O costs £10 5s. per ton), while its combining value is somewhat less. But those who use it appear to think its greater cost is balanced by the advantages mentioned above. This has led to an inquiry into the costs of both materials; and, by the courtesy of various managers of works, permission has been granted to publish the following figures. They are from a limited number of works only, but they have been selected geographically over the district, and include different types of distillation plant.

Class of Alkali Used.	Average Cost Delivered at Works per Ton.	Per Ton of Sulphate of Ammonia Made.	
		Average Consumption.	Average Cost.
	s. d.	Lbs.	s. d.
Cambs, Herts, and Kent chalk lime	19 3	319	2 8½
Surrey greystone chalk lime	16 3	257	1 10½
Buxton limestone lime	18 6	201	1 8
Caustic soda (70 to 72 per cent. Na_2O)	..	55	6 5½

These figures show that the quantity used and the cost per ton of chalk limes is distinctly greater than with other classes of limes; the most efficient being Buxton lime. At two works, experience was had with both varieties; and the cost and efficiency were markedly in favour of the latter.

Reporting upon the works in his district for the distillation of tar,

Mr. Sutton says no addition to the plant occurred last year at the nineteen works in which this operation is carried on, and the quantity of tar actually distilled was less than a few years ago, before the advent of tar-surfaced roads. The more complete dehydration of tar as a preliminary to distillation is receiving further attention; and at another of the larger works plant has recently been erected for the continuous heating and dehydration of the raw tar by means of the waste fuel gases. Appliances exist at all works for dealing with the permanent gases evolved at the outlet of the condensers, and it is only occasionally that any of them have been found faulty. No complaint occurred last year of nuisance arising from this class of work.

In the district comprising South Wales and Monmouthshire, which is under the supervision of Dr. Bailey, ten of the fifteen processes carried on in registered works for the manufacture of sulphate and muriate of ammonia are for dealing with gas liquor; the others being at coke-ovens having bye-products plant. Dr. Bailey says the plant generally was kept in good repair. In two instances, where oxide of iron heaps are used for dealing with the foul gases, it was necessary to call serious attention to the unsatisfactory nature of this portion of the plant; and in both cases steps were taken to put everything into satisfactory working order. The total amount of ammonium salts, in terms of sulphate of ammonia, produced during the year, shows an increase of less than 1 per cent. over the previous year. The number of works using plants for continuous distillation was 14; and practically the whole of the liquor was treated by this process.

Report to the Secretary for Scotland.

Following the reports of the District Inspectors is Mr. Carpenter's report to the Secretary for Scotland. The details of the work done in this portion of the United Kingdom are, as usual, furnished by Mr. W. S. Curphey, who is now the Chief Inspector. We extract the subjoined particulars.

The number of works in Scotland registered under the Alkali Act during the past year was 169; being an increase of six over the number registered in 1908. Eight works were added to the register, while the registration of two was discontinued. The processes carried on numbered 274, compared with 267 the preceding year. The quantity of salts of ammonia made (expressed as sulphate) was:—

	Tons.
Gas-liquor works	19,974
Iron-works	18,786
Shale-works	57,048
Producer gas, coke, and carbonizing works	16,945
Total	112,753

In the course of inspection, 590 visits were paid, and 405 examinations were made of the gases passing away from the various works The general average escape of muriatic acid from all the alkali works was 0·089 grain per cubic foot of chimney gases, equivalent to an escape of 2·7 per cent. on the quantity produced. The general average escape from all the sulphuric acid works was equivalent to 1·29 grains of sulphuric anhydride per cubic foot of total escaping gases. In both cases these general average figures are lower than the corresponding results obtained in 1908, and are both well within the limits prescribed by the Act. The means provided to prevent undue escape of noxious gases were maintained in an efficient condition in all the works.

The number of registered works in Scotland in which sulphate, chloride, or hydrate of ammonia was made last year was 102, or four more than in 1908; the number of such processes operated being 107. This increase in number was due to the addition to the register of four gas-works in which the manufacture of sulphate of ammonia was commenced during the year. Mr. Curphey remarks that, of late, with every year has come an increase in the number of gas-works where the liquor produced in the manufacture of illuminating gas is utilized locally for the preparation of sulphate of ammonia. This development, he says, is likely to continue, as there is a tendency among gas managers to adopt the practice in works in which hitherto the residual products have been sold, and also because the increasing production of gas in many works renders the local treatment of the ammoniacal liquor more attractive.

The total quantity of liquor distilled last year was equivalent to 19,974 tons of sulphate of ammonia; and the whole of it was treated by the continuous method. The sulphuretted hydrogen evolved was dealt with by the methods named in the following proportions, expressed in terms of sulphate of ammonia: By the Claus process, 11·65 per cent.; by oxide of iron purifiers, 77·39 per cent.; by combustion, 10·57 per cent.; by metallic salts or other methods, 0·39 per cent. These figures do not include the ammoniacal liquor dealt with in iron-works, shale-works, coke-oven or producer-gas works. No change in the mode of disposing of the waste gases in these classes of works occurred during the past year.

As shown above, the use of the oxide of iron purifier is the most common method of dealing with the waste gases given off in distilling gas liquor; and Mr. Curphey says that these purifiers were generally found in an efficient condition—entirely preventing any escape of sulphuretted hydrogen. Constant attention on the part of the management is, however, requisite to ensure that the purifiers are maintained in proper order, by changing the contents at sufficiently short intervals, and by supplying fresh oxide as that in use becomes fouled through repeated alternate action in the purifiers and revivification outside them. As the population increases, and the use of gas becomes more and more popularized, growth in output from gas-works results. Along with this more work is called for from the sulphate of ammonia plant; consequently entailing a greater demand on the means provided for dealing with the noxious gases. On this account, the means for cooling and purifying the waste gases require to be improved from time to time. During the past year, increased cooling appliances were provided in four works, and enlarged purifiers brought into operation in six.

The vacuum plant for distilling gas liquor continued in active use in three works during the year. The vacuum principle was likewise in operation in several works for the concentration of solutions of sulphate of ammonia produced when using dilute sulphuric acid. In this connection, Mr. Curphey says the vacuum method presents an advantage over older forms of open evaporators, avoiding, as it does, the formation of large clouds of moisture from the water evaporated.

The production of sulphate of ammonia in Scotland from all sources amounted, as shown by the figures tabulated above, to 112,753 tons—an increase of 7283 tons on the figures for 1908. This was due to a larger production in the several groups of works. In the iron-works, shale-works, and coke-oven works, greater activity in the chief products led to an increased yield of bye-products; while the gradual growth in the demand for illuminating gas is indicated by a greater production of ammoniacal liquor.

In the remarks by Mr. Carpenter which follow Mr. Curphey's report, he refers to the fact just alluded to, and points out that the total of 112,753 tons of sulphate made in Scotland forms nearly one-third of the produce of the United Kingdom.

In continuation of the table presented in recent annual reports of the progress of shale distillation and ammonia recovery, Mr. Carpenter gives the figures, compiled from the statistical returns to the Home Office on Mines and Quarries, for the ten years ended Dec. 31 last. They show that the total quantity of shale mined in the United Kingdom in 1910 was 2,282,221 tons; the amount of sulphate of ammonia recovered being 37,267 tons, or 36·6 lbs. per ton of shale. In 1905, the figures were 2,496,785 tons, 46,344 tons, and 41·6 lbs.; while last year they were 2,967,057 tons, 57,048 tons, and 43·1 lbs.

MANCHESTER CORPORATION SALARIES.

Reductions in the Gas Department—Discontented Officials.

The Special Committee appointed by the Manchester City Council to deal with the salaries and conditions of service of officials have completed their labours, and the report is now in the hands of members of the Council. It is a voluminous document, covering 225 printed pages, with numerous tables; and should the recommendations of the Special Committee be approved by the Council, a considerable saving is to be effected in the wages bill. In each department a minimum and maximum salary for the chief officials has been named; and the Committee consider it desirable that a retiring age should be fixed, to apply to all officials in the service of the Corporation—a suspension of the rule only to be made by consent of the Council by resolution—"provided that (except in the case of an official who, at the commencement of the scheme, should have attained the retiring age, or be of an age less than five years below the retiring age) such suspension should be for one year only." The Committee also consider it desirable that Corporation officials should reside within the boundaries of the City.

It is recommended that all advances of salaries and wages be annually considered by the various Committees; that where the maximum salary or wage fixed for a position is less than that received by the present occupant of such position, such occupant shall continue to hold office at the present salary or wage; and that all future appointments be made from candidates who have passed an open competitive examination—every employee under 21 to pass a medical examination.

Officials in the Gas Department are seriously affected by the Committee's recommendations. For example, in the prepayment meter department all the maximums of the principals are lower than the present salary—in one case £15, and in another £52. There are similar reductions in the meter stores (Whitworth Street West) department, and large reductions in the general stores department. The present salary of the Chief Gas Engineer is £1100; and £1250 is recommended for the present holder of the office, and £1000 as a maximum for future holders. In the case of the Gas Superintendent, the proposed minimum is £450 and maximum £600, the amount now paid to that official. The minimum for the Chief Clerk is put at £200, with £250 as the maximum. The present holder of the office gets £325 a year. The Accountant for the department will in future start at £250; the maximum being £400, a sum now paid to that official. At the various gas-stations, the salaries are to be reduced; and while some forty increases have been suggested on present figures by the Gas Committee, the Special Committee say "No" to about 35 of them. The highest remunerations to be paid are in various instances £50, £60, and nearly £100 below the Gas Committee's present idea of what should be paid. The Minutes Clerk of the Gas Committee, now drawing £250, has £100 suggested as the minimum and £150 the maximum for the position. Clerks in the gas-meter accounts and deposits departments now getting £117 and £104, are to come down to £91 and £65. In several cases the proposed reduction is from £5 to 30s.

On the question of office hours, it is recommended that throughout the service they shall be from 9 o'clock in the morning till 5 in the evening (with an interval of 40 minutes for lunch); and on Saturdays from 9 in the morning until 1 o'clock in the afternoon. Provision is made that, where the exigencies of business require an alteration of the foregoing hours in the case of particular officials, the Employing Committee shall have power to vary the hours; and it is also to be understood that every official is liable to be called upon to commence duty before, and to remain on duty after, office hours, under instructions from the head of the department, whenever necessary. Regarding holidays, the Committee recommend that, so far as public convenience admits, the Bank Holidays, Christmas Day, New Year's Day, Good Friday, the following Saturday; Whit-Wednesday, from noon, and the whole of Whit-Thursday, Friday, and Saturday be observed as holidays.

There are 19,667 employees of the Corporation; and in all grades the greatest dissatisfaction is expressed at the recommendations of the Committee. The "Guild Journal," the official organ of the municipal officers of Manchester, says: "The fact that expanding business and increasing prosperity may increase salaries in a private firm, does not necessarily apply to a corporation. Corporations stand alone—they are not run for profit. They are run for the good of the ratepayers—some will say these are closely identified. Officialdom should be run on the cheapest possible lines, and the yearly increase of work by the

additions of out-townships and city developments are not to be used in favour of increasing salaries. Careless expenditure in past years is no argument in favour of greater salaries. It rather tends the other way—the way of reduction. . . . Perhaps a first-rate set of councillors may eventually spring up to help the second-rate officials. Time may otherwise bring its compensations."

HALIFAX CORPORATION GAS UNDERTAKING.

The Past Year's Working.

The accounts of the gas undertaking of the Halifax Corporation for the past financial year have been issued; and we have received a copy from the Gas Engineer and Manager (Mr. J. Wilkinson). They show that the sale of 778,059,600 cubic feet of gas produced a revenue of £84,534; but a sum of £299 was paid to the Sowerby Bridge Urban District Council for 2,659,000 cubic feet supplied to Luddendon—bringing down the total to £84,235. The deduction of discounts further reduced this to £79,220. Meter-rents produced £2324; the sale of residual products, £26,255; and other items made up a total of £109,339. The principal items of expenditure in the past year were: Manufacture and purification of gas, £39,777; maintenance of works, £7791; distribution of gas, £4929; and management, &c., £5183—other items making up a total of £67,970, and leaving a gross profit of £41,369 to go to the net revenue account, compared with £38,809 this time last year. After meeting interest and sinking fund charges and paying income-tax, there was left a balance of £14,222, compared with £11,533 before. Adding the amount brought forward, £13,273, a total of £27,495 was produced. Out of this was paid to the borough fund account in aid of the rates for the year 1909-10, £7268; to the district fund account, £3634; and placed to the reserve fund, £3616; making a total of £14,518, and leaving a balance of £12,977. The amount added to the reserve fund brings it (with £788 interest on investments) up to £26,770.

The accounts relating to the working during the past year show that 72,328 tons of coal and 4860 gallons of oil were employed in the manufacture of 839,384,000 cubic feet of gas, of which 775,540,500 cubic feet were sold and 10,566,000 cubic feet used on the works. The leakage amounted to 53,275,500 cubic feet, or 6·33 per cent. The residuals were 32,611 tons of coke made for sale, 4434 tons of tar, and 862 tons of sulphate of ammonia. The cost of gas at the works was 13·95d. per 1000 cubic feet sold; and the expenses of distribution &c. (less meter-rents), came to 5·44d.—making a total of 19·39d. The total receipts for gas worked out to 24·52d. per 1000 cubic feet; showing a difference of 5·13d. The balance of profit was 4·4d.; and the accident insurance fund and the Charlestown brick-works site account for the rest.

PUBLIC LIGHTING OF NEWMARKET.

Gas Company's Tender Accepted.

The Newmarket Urban District Council held an adjourned meeting last Friday to consider the question of the public lighting of the town.

The Clerk (Mr. S. J. Ennion) read a letter from Mr. Frank A. Simpson, the Engineer of the Newmarket Electric Light Company, expressing regret that the time allowed for sending in tenders for the street lighting was so short that it was quite impossible for him to furnish the necessary particulars to his Board to enable them to tender. He said if the terms could be extended, they would be glad to go fully into the matter and submit a tender. He pointed out, however, that to enable his Company to submit a low tender, they would require the period of the contract to be for ten to fifteen years, as otherwise it would not pay them to expend the large amount of capital that would be required. He added that the Gas Company, having their pipes, posts, lanterns, and plant, were now in a much better position to quote for a longer period than his Company. The Clerk also read a tender submitted by Mr. J. H. Troughton, the Engineer, Manager, and Secretary of the Newmarket Gas Company, which contained the following offer: The amount of the expiring contract is £928 for 261 lamps, and after it was settled 10 extra lamps were taken over. Mr. Troughton offered to light these 271 lamps all the year round—viz., 2288 hours, and the existing winter corner lamps on the present basis of 1923 hours extra—for three years for the sum of £1100, or for five years for the sum of £1075. The present lamps consist of 227 No. 3 Kern burners of 80 to 90 candle power; 10 No. 4 Kern burners of 105 to 120 candle power; 7 No. 4 double burners of 210 to 240 candle power; and 27 self-intensified burners of 300 to 330 candle power. This makes 271 lamps in all, giving nearly 32,000-candle power, of which 9000-candle power is equally distributed in High Street, and the remaining 23,000-candle power over the rest of the district. Any increase in lighting hours to be paid for in proportion, and any additional lamps to be charged in accordance with a scale submitted. All other terms to be as contained in the existing agreement, except that the Company are to be allowed, during the continuance of the contract, to effect improvements in the system of lighting the streets by the adoption of better burners, lanterns, or other apparatus, at their own expense, provided that the lighting efficiency is not reduced. Mr. Troughton added that his Directors ventured to hope that the Council would see their way to again place a contract with the Company, who had spared no expense or trouble in keeping the lamps up to a high state of efficiency during the past five years. They believed they had given satisfaction to the Council and to the ratepayers; and they were proposing to make a considerable sacrifice in order to meet the public desire to have the lamps lighted every night in the year.

In the discussion which followed, the Chairman (Mr. H. Hambling) said the difference between the present hours of lighting (excluding June, July, and 16 days of August) was £99 on the five years' contract; and this was the one which he thought the Council should adopt. He accordingly moved that they accept the Gas Company's tender on this basis. Speaking personally, he would be very sorry to see the roads ripped up for laying down the electric light plant. Mr. O. E. Griffiths moved, as an amendment, that the tender for three years be accepted. He pointed out that it was only £25 more than the one proposed by the Chairman. Mr. Bonham seconded the amendment; and it was carried. Mr. Griffiths then moved that the next tender for public lighting should be asked for twelve months before it would come into force, so that the Electric Light Company could have an opportunity of tendering; and the motion was carried.

MANCHESTER GAS AND ELECTRICITY DEPARTMENTS.

The Relations of the Departments.

We learn from the "Manchester Guardian" that the affairs of the Gas and Electricity Departments of the Manchester Corporation are at present under the consideration of a Joint Committee. At the last meeting of the City Council, Alderman Gibson (the Chairman of the Gas Committee) stated that the chief officials of the two departments were about to meet, or had met, to consider the relationship between the two bodies, and the basis on which each department should make its contribution in relief of the rates. The Engineer, Superintendent, and Accountant of each department have had several conferences, and have prepared their report. Mr. Gibson said that he wished the two departments to work together as brothers, not as antagonists. It was with the idea of bringing this laudable state of affairs about, and making it permanent, that the officials set to work. It is understood the officials are unanimous in recommending that the outstanding debt of each department shall be the basis on which the amount to be allocated for the purpose of aiding the rates shall be computed. According to this mode of reckoning, the Electricity Department should contribute more than the Gas Department, because its debt is higher; the latter being £1,212,685, while the former is £1,970,112.

THE (NEW) TODDINGTON GAS COMPANY.

A Curious Report.

The "Financial News" on Saturday contained the following article dealing with the last annual report of this Company.

The annual report and statement of accounts of the (New) Toddington and District Gaslight and Coke Company, Limited, is in several respects a rather extraordinary document. The Auditors' report on the accounts is dated May 9, 1910, which shows that the accounts had been completed and audited at that date; but the annual meeting, at which the report and accounts will be presented, will not be held until the 30th inst. There seems to have been quite enough delay in bringing the accounts before the Auditors; but why another two months (nearly three months) should be allowed to lapse before shareholders have an opportunity of discussing them, certainly needs explanation. Then, strangely enough, the printed notice convening the meeting states that the business will be: "(1) To receive the Directors' report and accounts of the Company for the year ending December 31, 1910." Perhaps the person responsible for the drawing-up of the notice (or the printer) was so conscious of the delay that has taken place that he tried to mend matters by anticipating the future. In any case, the error in the date stifles criticism; nothing more pungent or satirical can be imagined.

Another curiosity in this report is the statement that the bankers of the Company are "The London and County Banking Company, Limited, Tunbridge Wells." As the London and County Banking Company, Limited, was amalgamated with the London and Westminster Bank in August last, it may be truthfully stated that there was no London and County Banking Company in this country at the time when the report was drawn up. Two such curious errors as these are not often found in one report. Indeed, more than usual care is expected in the composition of a document of this description; but such care appears to have been lacking in this case. The report itself is quite unsatisfactory. It says:

> The Directors still hope to extend the mains to a profitable portion of the district, and are now only awaiting a favourable opportunity to raise the necessary capital. Meanwhile, the present mains have been overhauled and repaired, and the loss of revenue by leakage greatly diminished, which will, no doubt, be shown in subsequent accounts. Great expenses have been incurred this year. All the beds of retorts were worn out and have been replaced by entirely new beds.

According to the accounts, the sales of gas and residuals during the year realized £561, and the expenses were £758—showing a loss of £197 on the year, to which has to be added a loss of £17 made in 1908, which does not look very promising for the raising of further capital.

It may, perhaps, be recalled that the (New) Toddington Gas Company was one of the Eaton group of gas companies which have been so frequently criticized in the columns of the "Financial News;" and on March 10, 1909, there appeared an article warning readers against purchases of the shares and debentures of this particular Company, which were being offered by the Water and Gas Debenture and Share Investment Trust, in a circular signed Sir C. B. Herne Soame, Bart. The warning seems to have been justified.

The report of the James Keith and Blackman Company, Limited, for the financial year to the 31st of March shows that the amount of business done exceeded that of any previous year. After providing for debenture interest and making sufficient allowance for depreciation and reserves against doubtful debts, the audited accounts show a net profit of £5291, which, with the balance brought forward, £2301, makes a total of £7593 standing at the credit of the profit and loss account. The Directors recommend that dividends should be declared at the rate of 5½ per cent. per annum on the preference shares and at the rate of 5 per cent. per annum (free of income-tax) on the ordinary shares; leaving £2389 to be carried forward.

LONDON COUNTY COUNCIL AND GAS TESTING.

Alteration of Conditions of Service of Examiners.

At the Meeting of the London County Council to-day, the Public Control Committee will submit a report giving the result of their consideration of the question of the desirability of altering the conditions of service of the Gas Examiners employed in the Chemical and Gas Testing Department.

According to the report, there are permanently employed in the department nineteen gas examiners, each of whom has charge of one testing-place. There are also a number of relieving gas examiners, appointed by the Council, who are employed, when necessary, at a daily fee. The salary attached to the position of gas examiner is £135 a year, rising by £5 annually to £165 a year; and the examiners do not contribute to the superannuation and provident fund. At present the conditions of appointment do not necessitate the permanent examiners devoting their whole time to the duties of the office, and all or most of them are engaged on other work. The Committee are of opinion that a more efficient control over the work of gas testing would be secured by substituting for the part-time examiners, as they retire, a class of officers whose whole services would be devoted to this work; and they suggest that each examiner should have charge of two testing-places instead of one as at present; that the salary of the new grade should be at the rate of £200 a year, rising by £10 annually to £250 a year; and that the examiners should be subject to the Council's regulations as to the superannuation and provident fund, sick pay, and other conditions of service applicable to such appointments.

It is proposed that examiners at present in charge of testing-places shall hold their appointments undisturbed; but that when a vacancy occurs in their number the other examiners shall be invited to apply for the position, while retaining their present one, at an addition to their present salary equal to the difference (£85) between the maximum of the present, and the maximum of the proposed, scale of salary. In the event of none of the present permanent examiners applying, it is suggested that the relieving gas examiners should be invited to apply for the vacant place, at the salary of £135, rising by £5 to £165, on the understanding that the officer appointed would be required to take the next testing-place falling vacant, at an addition in salary equal to the difference (£65) between the minimum of the present and the minimum of the proposed scale.

With regard to the financial aspect of the question, the Committee consider the gross ultimate saving on the salaries of the permanent staff will amount to £685 per annum; but, taking into account the cost of admitting the whole-time men to the benefits of the superannuation fund, the cost of travelling between stations, and the provision of relieving examiners during sickness or holidays, the actual saving is estimated at about £300 a year.

The Committee submitted recommendations in accordance with their proposals.

PUBLIC LIGHTING OF FINSBURY.

Another Victory for Gas.

At the Meeting of the Finsbury Borough Council last Thursday, the Works Committee presented a further report on the subject of the public lighting of the borough. As already mentioned in the "JOURNAL" (*ante*, p. 145), at the previous meeting the Committee reported that they had had under consideration a letter from the Gaslight and Coke Company with reference to experiments lately carried out by them in certain streets of the borough with inverted burner incandescent gas-lamps; and they recommended that the Company's proposals should be accepted. The consideration of the matter was then deferred. The Committee now stated that they had reconsidered their report in conjunction with one by the Borough Surveyor as to his further conference with the Company on the subject, and the correspondence which had taken place relative to the general question, and had resolved to report to the Council to the effect stated below.

The Committee have further satisfied themselves that the cost of public lighting during the year ended March 31—viz., £7438 11s.—is the minimum expenditure with which any comparison of the advantages of a new lighting scheme can properly be made, having regard to the considerably larger number of burners then and now in use than during earlier years. That such a comparison shows that, notwithstanding the scheme offered by the Gaslight and Coke Company provides for the improved lighting of the borough to the extent of an increased candle power of 100,000, or an improvement of more than 71 per cent. on the present aggregate candle power of 140,000, and will avoid the necessity otherwise for the Council shortly to incur heavy capital expenditure in the renewal of lanterns even with the present system of lighting, its adoption by the Council will effect a further saving to the Council of £525 per annum.

In the event of the scheme being adopted, the Company are prepared to enter into a formal agreement with the Council providing as follows: The agreement to take effect as from Oct. 1, 1910, for a period of ten years, determinable then or thereafter subject to six months' notice on either side, or by the Council at Sept. 30, 1915, subject to a like notice by the Council, and to payment to the Company of the sum of £3500, or at Sept. 30, 1917, subject to a like notice and to payment by the Council of the sum of £2100. The Company, within four months from the date of the agreement (under a penalty of £1 per day) to provide new copper lanterns, burners, and fittings to all the public lamps in the borough, such lanterns, &c., to become the property of the Council on the termination of the agreement; the present lanterns, burners, and fittings to become the property of the Company as replaced. The number of lanterns to be approximately 1000 with single 80-candle inverted burners, 624 with two do., 200 with three do., and 38 with four do.—making a total of 1862.

The Company will supply gas at the rate of not less than 3½ cubic feet per burner per hour for the usual lighting hours—viz., 4300 per annum—and light, extinguish, cleanse, and paint yearly with two coats of approved colour, and repair and maintain, the columns, lamps, and services at the following annual charges, to be payable in four equal quarterly instalments: Per one-burner lamp, £2 15s.; per two-burner lamp, £4 6s.; per three-burner lamp, £6; per four-burner lamp, £7 7s. 6d. The Company will supply gas and light and extinguish in times of fog or other special occasions at the following charges: Per one-burner lamp, ¼d. per hour or part thereof; per two-burner lamp, ½d.; per three-burner lamp, ¾d.; per four-burner lamp, 1d.

The Company will at all times, when replacing burners that have become worn out, replace with the most efficient burners adaptable and then obtainable. The gas supplied will be of not less than the statutory illuminating power; and in the event of reduction of the latter below 14 candles, the Company will make such alterations to the burners and [or] supply such extra quantity of gas as shall ensure a light equal to that provided for. The Company will indemnify the Council against all liability under the Workmen's Compensation Acts, and otherwise in connection with the work under the contract. On default of the Company to perform their obligations, the Council will be empowered to employ other persons at the Company's expense—all disputes to be referred to the arbitrament of the President for the time being of the Institution of Civil Engineers.

The Committee further reported that the question of safeguarding the interests of the Council's workmen, who, in the event of the contract being arranged, would become the servants of the Company, had been further raised; and their views thereon were expressed in a number of extracts from a communication from the Company. The Company asked the Council to accept their promise, as an honourable corporation, to give employment to the men at present in the service of the Council, so long as these men continued to serve the Company faithfully and efficiently. It was pointed out that the Company subscribe liberally to the workmen's provident societies, which provide ample benefits for the men when they fall sick, with allowances at death and to the widows and orphans on a generous scale; and all aged workmen who have been in service for 25 years are pensioned.

The report concluded as follows: "The Committee are still of opinion that the proposals and terms offered by the Company are such as should be accepted by the Council. They accordingly again recommend the Council to accept the offer of the Company to undertake the improved lighting of the borough in the manner and in accordance with the terms indicated, for a period of ten years, commencing on the 1st of October next, subject to the option exercisable by the Council of terminating the contract at the conclusion of five years on payment of the sum of £3500, or at the expiration of seven years on payment of the sum of £2100; that it be referred to the Council's Solicitors to approve the necessary contract; and that steps be taken to terminate the engagement of the foremen, lamplighters, and gas-fitters on the 30th of September next. The Committee have resolved to again report to the Council that they are unable to advise the adoption of the proposals submitted by the County of London Electric Supply Company, Limited, for the experimental lighting by electricity of certain portions of the borough, and to recommend that the Company be so informed."

The only new point raised since the previous meeting was a letter from the Chief Inspector of the Gas Company (Mr. F. W. Goodenough), stating that the Company's benevolent and provident fund had a balance of £126,000; so that the interest of the men who would be taken over would be looked after in this respect. It was suggested that the Company should be asked to admit these workmen at once to the benefits of the provident fund, instead of waiting a year. The Chairman of the Works Committee said he would vouch for this.

There was no discussion; and the report was carried *nem. con.*

PUBLIC LIGHTING OF TOTTENHAM.

The Gas Company Secure a Contract.

At the Meeting of the Tottenham Urban District Council last Tuesday, the General Purposes Committee submitted a report upon correspondence which had taken place with the North Metropolitan Electric Power Supply Company and the Tottenham and Edmonton Gas Company on the subject of the public lighting. The first-named Company wrote stating that they were not prepared to tender for the lighting of the whole of the Council's district unless they were allowed to submit an offer for a minimum period of five years, or for lighting that part of the district in which their mains are at present laid for a minimum period of three years. The Gas Company had quoted reduced terms on the existing contract, subject to the Council entering into an agreement for a period of ten years. The Council's Engineer interviewed the Engineer and Manager of the Gas Company (Mr. A. E. Broadberry), and requested him to forward his Company's terms for the public lighting for one, three, and five years in addition to the period of ten years. In reply, the Company stated that they were unable to reduce the existing charges if the contract was renewed for one year only; but for a period of three years they would allow a reduction of 25 per cent. on the total reduction quoted for ten years, or for a period of five years an allowance of 50 per cent. on the quoted reduction. The net annual saving on these terms would be as follows: For three years, £63 4s. 4d.; for five years, £126 8s. 9d.; for ten years, £252 7s. 6d.

The Committee recommended the Council to accept the Gas Company's terms for a period of three years. An amendment was moved to refer the matter back; the proposer expressing the opinion that the Electric Light Company should be given a chance to light a portion of the district. This was, however, defeated. Another amendment was submitted that the agreement should be for twelve months only; it being suggested that a yearly agreement with the threat of competition might induce the Company to improve the lighting. This amendment was also defeated; and the Committee's recommendation was adopted.

At the meeting of the Woolwich Borough Council last Wednesday, they accepted the quotation of the Gaslight and Coke Company at £16 14s. 10d. for supplying and fixing gas-fittings in the new library; also their quotation of £2 18s. per annum for keeping the gas installation in order.

WATER SUPPLIES PROTECTION BILL.

The Committee's Report.

The Joint Committee of the two Houses of Parliament, to whom this Bill was referred, have agreed upon their report; and we publish it to-day—notwithstanding the fact that, in consequence of unusual pressure on our space of late, it has not so far been possible to complete the summary that is being given in the "JOURNAL" of the evidence adduced for and against the Bill.

REPORT OF THE COMMITTEE.

1.—The Bill proposes to restrict the powers of authorized water undertakers in the following ways: (1) By preventing the acquisition of fresh supplies without specific parliamentary authority; (2) by rendering the undertakers liable to give compensation for injury to private supplies caused by their works; and (3) where water is taken from one district to supply another, by conferring on the local authorities of the districts from and through which the water is taken the right to demand a supply from the works of the undertakers on terms to be agreed or fixed by the Local Government Board.

2.—On point 1, the Committee are in favour of the principle that Parliament, before sanctioning a scheme for the abstraction of underground water, should be in possession of full information as to the objects of the scheme and the means for carrying it into effect. But they consider that, in the present imperfect state of information on the subject of underground water, parliamentary control over such schemes can be better secured by the insertion of any necessary safeguard in each Bill which comes before Parliament than by making clause 3 of the present Bill part of the general law. The peculiarities of water schemes are manifold; and the adaptation of means to ends in respect of them is more likely to be secured by a rule of procedure susceptible of alteration on cause shown, than by a general law which might be at once too wide and too rigid in its application. The Committee are aware that clause 3 of the Bill is based on clause 8 of the Model Bills and Clauses (as amended in 1909); but, apart from objections taken to its alleged retrospective character, clause 3 of the Bill has been questioned—reasonably, the Committee think—as being too inquisitorial and too inflexible. For example, as the clause stands, it requires that a specification of the works for taking or intercepting water should be made. But evidence was adduced before the Committee to show that such a specification might often be impracticable and often undesirable; while it might sometimes be better to impose a limit on the quantity of water to be taken rather than to require a description of works or engineering plant, which might impede the adoption of new improvements in machinery or hamper freedom of action in emergencies. Therefore the Committee think it better, at all events for the present, that each case should be dealt with on its merits, and that discretion and full liberty of action should be preserved to Parliament in connection with each Bill presented to it.

3.—As regards the question of compensation (point 2 of paragraph 1), it is clear that to give a right to compensation for loss of subsoil water, even within the limitations proposed by the Bill, involves an important alteration of the general law, which, as it stands, recognizes no property in underground water unless it is flowing in a known and definite channel. But as the law was settled before the conditions in which its equity is now challenged had come into being, it is urged on the Committee as reasonable and proper that the law should be reconsidered in view of the altered circumstances of the present time.

4.—On the evidence given before them, the Committee are satisfied that serious damage has been done to private property in particular localities by the pumping operations of water authorities; and they think it not improbable that similar injury is also caused by collieries, breweries, railway companies, and similar agencies, who, like water authorities, extract water from the subsoil, but, unlike them, are under no statutory obligations as regards the use to which such water is put. It has been forcibly urged on the Committee that if it be fair and equitable to levy compensation, as the Bill proposes, from water undertakers for injury done by the abstraction of water from the subsoil of private property, then the application of the same rule or treatment to all other agencies or industries causing similar injury cannot be resisted. In other words, it is claimed that any such change in the law as the Bill proposes should, if approved by Parliament, be made of general and reciprocal application.

5.—An inquiry into the abstraction of underground water by the industrial and commercial enterprises referred to, lay outside the scope of the Bill; and the Committee were therefore unable to inquire into that aspect of the question with the necessary particularity, or to give the great interests concerned the opportunity of being heard. Moreover, the effect on the general health of the local community of the desiccation of the soil in the areas concerned, could not be fully investigated in connection with the Bill. In these circumstances, the Committee can go no further than to say that, while they consider as worthy of notice the considerable body of evidence on their minutes in favour of the principle of compensation for damage done by the extraction of subsoil water, and while they also desire to draw attention to the evidence as to the difficulties to which it is alleged the general application of the principle of compensation would lead, they are unable to form a definite conclusion or make any recommendation on the subject, which is indeed of vast and far-reaching importance, without further careful and detailed inquiry. It is not only for this reason but for other reasons, to be presently mentioned, that they wish to repeat the recommendation of the Royal Commission on Sewage Disposal contained in their third report, published in 1903, that a comprehensive inquiry into the whole subject of surface and underground water supplies should be held before any legislative action is taken of the kind proposed in this Bill.

6.—The Bill proposes that, where claims for compensation are made, the ordinary law as to the burden of proof should be altered, and, within the area specified in the Bill, the burden be transferred from the claimant to the undertakers. In support of this proposition, certain Acts of Parliament were cited before the Committee by which Parliament has changed the burden of proof in the direction indicated. But in every one of these Acts except one—the South Staffordshire Act of 1909—the protection given is limited either to specified persons or wells or to water supplies in particular estates or districts; while in the case of the South Staffordshire Act, both the circumstances under which the Act was passed and the language employed in it touching the burden of proof make the Committee averse to regarding it as laying down a precedent to be generally followed for imposing on a defendant the burden of proving the negative. The Committee consider that while the shifting of the burden of proof may be ustified in reference to a designated person or specified source of water supply or narrowly limited area of land, it cannot, as a general proposition, be supported even within the limits laid down in the Bill; and as in the Bill this particular provision assumes the shape of a general principle, the Committee desire to express their disapproval of it as such. The Committee are also of opinion, in view of the dearth of information before them regarding geological formations in connection with underground water supplies, that no general definition or limitation of a "protected area" can be made with any pretence to accuracy. In respect to this point, each case should, they think, be decided on its merits.

7.—The Committee have heard a considerable body of evidence on the subject of distribution of water in transit(point 3 of paragraph 1), and have considered the recommendations made in that connection by the Royal Commission on Water Supply (1869). While the Committee are of opinion that a claim for water supply made by the local authorities of the area which would naturally have recourse to the source of supply proposed to be appropriated may, as a general rule, be reasonably complied with, they abstain from making any such recommendation in favour of other districts through which the mains may pass. Instead of supporting any such rule for the compulsory distribution of water (distribution by private agreement remaining unfettered), the Committee suggest that the question whether or not water should be compulsorily distributed *in transitu*, and if distributed then on what conditions and terms, should be determined when the authority to take water is first conferred. Indeed, they are of opinion that any local authority asking for such a distribution should be obliged to enter into a definite obligation to take or pay for the supply so demanded. This procedure will have the additional advantage of enabling the authorized undertakers, from the outset, to lay their plans and frame their estimates on a clear conception of the obligations they incur. The Committee are strengthened in this view by the desirability of conserving in all reasonable ways the water supply of the country. They think that local authorities should be encouraged, if not required, to turn all local sources of water supply to the best account; and they are apprehensive that this may not be always done if the districts other than the area above referred to are enabled to claim as of right a distribution of water *in transitu* from the mains of great undertakings.

8.—The Committee, while not desiring to diminish the existing powers of local authorities under the Public Health Acts, are of opinion that such authorities should be relieved from the necessity of promoting a Bill in Parliament in connection with water supply in all cases where the procedure by Provisional Order is applicable. In these cases powers are not granted without a public local inquiry, at which all parties interested are entitled to be heard. Opportunity for securing adequate protection would be thereby afforded to the various interests concerned, without imposing on the local authority and the ratepayers the expense of coming to Parliament by Bill, which would in many cases be prohibitive, and might involve serious delay. It should be added that rural councils have at present no authority to pay out of the rates the costs of promoting a Bill in Parliament without an undesirable alteration in the existing law being first made.

9.—In this connection, the Committee desire to draw attention to the inadequate powers at present possessed by local authorities for the compulsory acquisition of water rights. Under the existing law, they possess the powers of compulsorily acquiring rights in land, of course, on fair terms; but unless they can obtain rights in water by agreement, which involves the condition, insuperable in some cases, of obtaining the consent of every riparian owner, they are compelled to incur the expense of promoting a Bill in Parliament (which, as already stated, rural councils cannot do under the existing law) or to abandon their project. The procedure by Provisional Order enables all parties to have their claims adjudicated upon before the Order is made, and reviewed in Parliament before the Order becomes an Act and operative. In these circumstances, the Committee, having special regard to the obligations placed on local authorities to provide an adequate supply of potable water, suggest that, subject to due provision for compensation water being made, these authorities should not be in a worse position respecting the acquisition of water rights than they are respecting the acquisition of rights in land. The Select Committee on the Public Health Act (1875) Amendment Bill, 1878, recommended that "with the view of affording to local authorities facilities for acquiring the right to take water from any stream, the Local Government Board should be empowered to issue Provisional Orders which, on confirmation by Parliament, would confer powers on the local authorities for the purpose." The Irish Public Health Act, 1878, already confers this power upon Irish local authorities; and, in view of all the facts, the Committee fully concur in, and desire to repeat, this recommendation of the Select Committee of 1878.

10.—Having thus expressed their opinion on the more important clauses of the Bill, the Committee desire, in conclusion, to draw attention to the larger question which has been raised by the evidence placed before them. Several witnesses have expressed their apprehension that the water supply of the country is not being utilized to the best advantage, owing to the want of information on the subject of the general water supply, particularly the subsoil supply, and the haphazard and arbitrary fashion in which local sources of supply are sometimes wasted, sometimes withheld from use, and sometimes appropriated for the benefit of other, and often distant, places without regard to the needs of the locality from which the water is taken or of the country as a whole. The Committee were struck by the absence of trustworthy, and indeed often of any, information as to the subsoil water supply available in any particular district, and as to the effect of rainfall on the water levels in various parts of the country. They even saw some reason to doubt whether the powers for protecting rivers from

pollution possessed by local bodies are effectively exercised by them. They consider that a remedy for this state of things is urgently called for, and they think it may be found by creating an organization empowered to inquire into the whole question of surface and underground water supplies from a comprehensive standpoint, to supervise the future allocation of supplies, and to serve as an authoritative adviser to Parliament in the consideration of particular schemes.

11.—This suggestion is really no new one. In the report of 1869, to which reference has been made in paragraph 7, the Royal Commission recommended "that no town or district should be allowed to appropriate a source of supply which naturally and geographically belongs to a town or district nearer to such source, unless under special circumstances which justify the appropriation." In 1893, the Royal Commission on the Metropolitan Water Supply drew attention to the importance of procuring accurate information as to the effect of pumping from the chalk on the level of the water in the wells from which it is pumped, and urged that definite obligations should be laid on water authorities to keep and supply such records. The Royal Commission on Water Supply within the limits of the Metropolitan Water Companies (1899) concurred in this recommendation, and added: "We do not think it necessary to specify in detail the observations which should be kept, because we suggest later on in this report that the Local Government Board should have a general power of requiring the companies to supply information as to their works."

12.—A more specific recommendation as to the creation of a Water Authority is contained in paragraph 31 of the interim report of the Royal Commission on Sewage Disposal (published in 1901), which runs as follows: "We are of opinion that the general protection of our rivers is a matter of such grave concern as to demand the creation of a separate Commission, or a new department of the Local Government Board, which shall be a Supreme Rivers Authority dealing with matters relating to rivers and their purification." The question was further developed in the third report (already referred to) of the same Royal Commission, which was published in 1903. In paragraph 44, it was stated: "In our opinion, a properly equipped Central Authority is essential; and we unhesitatingly recommend the creation of such an Authority." And, again, in paragraph 48: "The work of the Central Authority will be so intimately connected with the work of the Local Government Board, that it will be desirable to make it a new department under the Local Government Board rather than have an entirely separate department."

The same report goes on to recommend the creation of Rivers Boards throughout the country, to be formed out of Joint Committees of County Councils, each having jurisdiction over the whole of a watershed and river basin. The Central Authority would ascertain what grouping of counties was most effective, and then take steps to constitute Rivers Boards for these areas. With the aid of the Rivers Boards, the Central Authority would collect the information available throughout the country in regard to waste of water by pumping from mines, the use of water in industrial works, and the abstraction of water from one district for the supply of another. The report stated in conclusion: "We entirely agree that the collection of such information should precede the consideration of the question whether legislative interference in regard to these matters is desirable."

Finally, the fifth report of the same Royal Commission summarizes their recommendations on this subject as follows (paragraph 356): "That ultimate control should be vested in an adequately-equipped Central Administrative Authority, and that, as far as practicable, the local Rivers Board should, in accordance with regulations framed by the Central Department, act as a first tribunal. Among the more important questions which have to be dealt with under the new conditions of administration which we are contemplating are the following: ". . . (iii.) The protection of water supplies from pollution. (iv.) The collection of information as to the water supplies available in various parts of the country. (v.) The collection of information as to the need of water in various parts of the country."

13.—The Committee cannot find that any effective action—they may, indeed, say any action at all—has been taken on these repeated recommendations. Thus all, it will be perceived, assert the same principle—viz., that there is urgent need for a survey, at once comprehensive and in detail, of the water supplies and water needs of the country, and for the adoption of measures for conserving the supply and disposing of it to the best advantage. A number of witnesses, confirming the recommendations of these Royal Commissions, have pointed out to the Committee the desirability of establishing some authority to take cognizance of all questions, both atmospheric and geological, which affect water supplies, and to serve as an authoritative referee when in any future inquiries before Parliamentary Committees the allocation of sources of supply comes in question. With this view the Committee entirely agree; and they strongly recommend, firstly, the establishment (within the Local Government Board or independently, as may seem best to the Government) of such a Central Administrative Authority as is contemplated in paragraph 356 of the fifth report of the Royal Commission on Sewage Disposal (already quoted); and, secondly, the division of the country into watershed areas, and the appointment for those areas of local Representative Boards, who, subject to the guidance and control of the Central Authority, should prosecute systematic and continuous inquiries into the water supply of their jurisdiction, take all necessary measures to husband such supplies, both surface and subsoil, secure their preservation from pollution, and advise on their allocation for sanitary, industrial, and other purposes.

Water Charges for Motor-Cars.—In the Bill promoted by the Bradford Corporation this session, they sought power to make an extra charge for water supplied to a coach or motor-car house occupied and rated with a private dwelling. They had attempted to collect a charge of 1s. per horse power over and above the ordinary water-rate in respect of each private car kept by a consumer; but finding themselves unable to enforce the charge, they sought to obtain parliamentary powers to enable them to do so. The effect of the clause, had it become law, would have been to nullify certain decisions of the High Court of Justice which the Automobile Club were instrumental in obtaining. The clause would also have been a precedent upon which other water authorities would have asked for similar powers. On the initiative of the Bradford Automobile Club, a petition against the clause was presented by the Royal Automobile Club, who briefed Counsel to support it; but the Corporation agreed to make certain alterations in the clause which satisfied the opponents.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 251.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Apl 1	5	Alliance & Dublin Ord.	81–83	..	6 0 6
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	May 12	7	Bombay, Ltd.	6¼–6⅜	..	5 9 10
40,000	5		7	Do. New, £4 paid	4⅜–5⅛	..	5 9 3
50,000	10	Feb. 25	15	Bourne-	29–30	..	5 0 0
311,810	10		7	mouth Gas } B 7 p.c.	16½–16⅝	..	4 3 7
75,000	10		6	and Water } Pref. 6 p.c.	15–15⅜	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	252–255	+1	4 18 1
300,000	,,		9½	Do. New	188–190	..	5 0 0
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	June 10	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	214–217	..	5 1 5
246,320	,,		8	Do. A Ord. Stk.	153–156	..	5 2 7
460,000	20	Apl. 1	10⅝	British	44–45	..	4 14 8
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	119–121	+1	4 19 2
165,700	,,	,,	4½	Do. B 3½ p.c.	89–91	+1	4 18 11
82,278	,,	,,	5½	Do. C 5 p.c.	106–108	+1	5 1 10
55,000	,,	June 29	3½	Do. 3½ p.c. Deb.	85–87	..	4 0 6
250,000	Stk.	June 29	4	Buenos Ayres 4 p.c. Deb.	97–99	+1	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	3–4	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅛–6½	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	49–50	..	6 0 0
100,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	88–90	..	5 0 0
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,513,280	Stk.	Feb 25	5 9/10	Commercial 4 p.c. Stk.	108–110	..	4 14 7
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	June 29	3	Do. 3 p.c. Deb. Stk.	80–82	..	3 13 2
800 000	Stk.	June 10	5	Continental Union, Ltd.	91–94	..	5 6 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–137	..	5 2 2
492,270	Stk.	—	5½	Derby Con. Stk.	121–123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	104–105	..	3 16 2
148,995	,,	Apl. 1	5	East Hull 5 p.c. Ord.	96–98	..	5 2 0
486,090	10	July 14	12	European, Ltd.	23⅜–24⅜*	..	4 18 9
354,060	10	,,	12	Do. £7 10s. paid.	17⅞–18⅛*	..	4 18 8
16,198,670	Stk.	Feb. 10	4⅜	Gas } 4 p.c. Ord.	105½–106½	+½	4 7 7
2,600,000	,,	,,	3½	light } 3½ p.c. max.	89–91	+1	3 16 11
4,062,235	,,	,,	4	and } 4 p.c. Con. Pref.	104–106	..	3 15 6
4,531,706	,,	June 29	3	Coke } 3 p.c. Con. Deb.	80–82	..	3 13 2
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93–95	..	5 5 3
82,500	,,	,,	6½	Do. do. 5 p.c.	117–119	..	5 9 3
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17–17⅛	..	6 5 9
131,000	Stk.	Mar. 16	7	Ilford A and C	145–147	..	4 15 3
65,780	,,	,,	5½	Do. B	109–111	..	4 19 1
65,500	,,	June 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
4,940,000	Stk.	May 12	8	Imperial Continental	179–181	+1	4 8 5
1,235,000	Stk.	Feb 10	3½	Do. 3½ p.c. Deb. Red.	94–96	..	3 12 11
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	122–124	..	4 16 9
561,000	Stk.	Feb. 25	10	Liverpool United A.	219–221	..	4 10 6
718,100	,,	,,	7	Do. B	164½–165½	+½	4 4 7
306,083	,,	June 29	4	Do. Deb. Stk.	104–106	..	3 15 6
75,000	5	June 29	6	Malta & Mediterranean.	4⅞–4⅞	..	6 4 8
560,000	100	Apl. 1	5	Met. of } 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd.	12½–13	..	5 7 8
1,775,892	Stk.	Feb. 25	4⅜	Newc'tle & G'tesh'd Con	103⅜–104½	..	4 3 9
529,435	Stk.	June 29	3½	Do. 3½ p.c. Deb.	89–91	..	3 16 11
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	13½–13¾	..	5 1 10
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	138–140	..	5 14 4
60,000	5	Apl. 1	8	Ottoman, Ltd.	6¼–6⅜	..	6 3 1
31,800	53	Feb. 25	13	Portsea Island A.	134–136	..	5 1 0
60,000	50	,,	13	Do. B.	126–128	..	5 1 7
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Apl. 29	7	Primitiva Ord.	7¼–7½	..	4 13 4
796,980	5	June 29	5	Do. 5 p.c. Pref.	5¼–5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb.	97–99	..	4 0 10
312,650	Stk.	June 29	4	River Plate 4 p.c. Deb.	97–99	..	4 0 10
250,000	10	Apl. 1	9	San Paulo, Ltd.	15⅜–16⅛	..	5 10 9
62,500	10	,,	6	Do. 6 p.c. Pref.	11¼–12¼	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49–50	..	5 0 0
135,000	Stk.	Mch. 16	10	Sheffield A	234–236	..	4 4 9
209,984	,,	,,	10	Do. B	234–236	..	4 4 9
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	May 27	7	South African	11–11⅛	..	6 1 9
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	121–123	+½	4 8 10
1,895,445	,,	July 14	3	Do. 3 p.c. Deb.	79–81*	..	3 14 1
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157–158	..	5 1 3
605,000	Stk.	Feb. 25	5⅜	S'th Suburb'n Ord. 5 p.c.	121–123	..	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	..	4 1 4
117,058	,,	July 14	5	Do. 5 p.c. Deb. Stk.	120–122*	..	4 2 0
502,310	Stk.	May 12	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6⅞	Tottenham } A 5 p.c.	133–135	..	5 1 9
453,940	,,	,,	5⅜	and } B 3½ p.c.	113–115	..	4 13 6
149,470	,,	June 29	4	Edmonton } 4 p.c. Deb.	57–59	..	4 0 10
182,380	10	June 10	8	Tuscan, Ltd.	9–9½	..	8 8 6
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	97–99	..	5 1 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	113–115	..	4 6 11
255,636	Stk.	Feb. 25	6⅜	Wands- } B 3½ p.c.	139–141	..	4 14 0
79,416	,,	June 29	3	worth } 3 p.c. Deb. Stk.	73–75	..	4 0 0

Prices marked * are "Ex div."

BACUP CORPORATION WATER SUPPLY.

Opening of New Works.

Last Thursday, the new water-works of the Corporation of Bacup were opened in the presence of a large gathering of neighbouring authorities, who were afterwards entertained at luncheon by the Mayor (Alderman J. H. Maden), who laid the first stone on March 13, 1901, and who has been Mayor ever since. Waters are collected from a moorland drainage area of 593 acres situate in the Cowpe Valley, near Bacup; and 15 miles of pipes have been laid. During the progress of the works, a fault occurred in the strata, which necessitated the sinking of trenches to a depth of nearly 200 feet. The total length of the embankment is 422 yards, and the maximum width at the base 570 feet. The reservoir has a water area of nearly 17 acres, and a capacity of 135 million gallons. The works are capable of maintaining a supply of 850,000 gallons of water per day during three consecutive dry years. There is also a high-level reservoir at an elevation of 1323 feet above the sea. It holds 2½ million gallons, and will supply the higher parts of the district. The total amount sanctioned by Parliament for the scheme, of which Messrs. James Diggle and Son, of Heywood and Westminster, were the Engineers, was £215,000.

At the opening ceremony, the party assembled near the valve-house, and Mr. Diggle, after describing the works, presented Mrs. Hardman (wife of Alderman Hardman, the Chairman of the Water Committee of the Corporation) with a gold key for the purpose of opening the door. Alderman Hardman then requested the Mayoress (Mrs. Maden) to perform the ceremony of opening the new works by turning on the valve. This having been done, the Engineer made a presentation to the Mayoress. Votes of thanks terminated the proceedings.

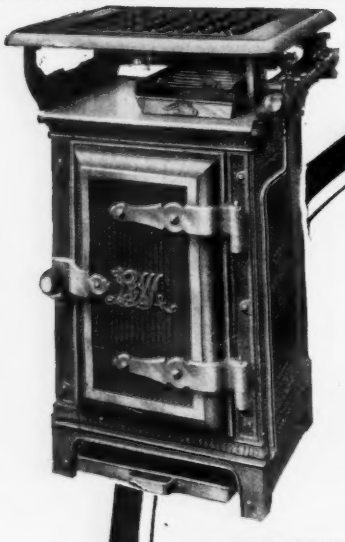
At the luncheon which followed, Alderman J. Shuttleworth said the coming generations would have cause to remember with gratitude the forethought, sagacity, and energy of the Corporation of Bacup, which had put the town in possession of fine water works. Mr. Diggle said the old water undertaking went on for something like half-a-century; and about the year 1887 he was called in by the Rossendale Water Company, and advised the construction of filter-beds at Sheephouse, as the quality of the water was very unsatisfactory, highly coloured, and not free from smell. At that time only 9830 people were being supplied out of a population of 24,000; the water, which was peaty, being collected from about 140 acres of land. It was unfit for drinking purposes, and at that time there was a lot of lead poisoning in the district. Filters were erected, and did some good; but they were not sufficient. They then entered upon the Cowpe Valley scheme, which had been consummated that day. The cost had been great; but the scheme would in the end prove a blessing to the district—the health of the community depending chiefly on a pure water supply. The scheme had occasioned considerable anxiety; but he was proud of it, as the Corporation had works that were water-tight from end to end. The Mayor of Rochdale (Mr. Wilson Dunning) said it was satisfactory to them to know what pure water there was in the Cowpe reservoir. The scheme was a large undertaking; and Bacup was to be congratulated on its successful completion.

BARROW-IN-FURNESS WATER SUPPLY.

Completion of the Duddon Works.

The new Duddon Water-Works for the Barrow-in-Furness Corporation were opened last Thursday by Lord Richard Cavendish. A compensation dam has been formed across Seathwaite Tarn at the head of the Duddon Valley, by which the water-level has been raised 20 feet, increasing the area of the tarn from 41 to 63 acres, and the capacity from 350 million to 625 million gallons. The scheme also included intake works from the River Duddon, settling-ponds some four miles above Duddon Bridge, and the laying of a 22-inch pipe-line to the Barrow high-service reservoir. The area of the watershed above the intake is about 12,000 acres, of which 1200 acres form the watershed draining into the Seathwaite Tarn. The foundation of the dam is solid rock for its entire length of 1212 feet; the dam being provided with an overflow 50 feet in length. The maximum thickness of the wall is 26 ft. 6 in., and the minimum 5 feet. The total capacity of the reservoir is 625 million gallons; and the water can be drawn off by means of an 18-inch discharge-pipe. The intake is constructed of cement concrete, with a limestone crest 104 feet in length. It is placed diagonally across the river, and contains a fish-pass in accordance with the requirements of the Board of Fisheries and Agriculture. The work of making the dam and intake was carried out by Messrs. Kennedy, Limited, of Glasgow, at a cost of £55,465; and the pipe-line was laid by Messrs. John Aird and Sons, at a cost of £68,375.

Vienna Water Supply.—After being under construction for about ten years, the new water-works of Vienna are nearly completed, and will be inaugurated at the end of this year. Supplies are derived from mountain springs, and brought to the city by an aqueduct, 113 miles long, built mainly of concrete, and measuring 6 ft. 10½ in. high by 6 ft. 3 in. wide. Numerous tunnels have been driven on the line of the conduit, one of them being 3½ miles long; while the total length of the tunnels aggregates nearly 53½ miles. As a general rule, valleys have been crossed by syphons with the collective length of 13 miles; but there are also about 100 bridges accounting for some five miles of the aqueduct. The new aqueduct will bring into Vienna an auxiliary supply of more than 50 million gallons of water daily, which will be a welcome addition to the yield from the existing works, the output of which ranges from 35 million gallons a day down to 26 millions, according to circumstances.



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LONDON, GLASGOW & FALKIRK.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Perth Corporation Gas Department had a very prosperous time last year. It is reported that their ordinary expenditure, estimated at £26,184, amounted to £25,378; the cost of coal, for one thing, being £1800 less than in the preceding year. The receipts, estimated at £39,442, amounted to £40,011. The estimated balance was £13,258, and the actual balance £14,633. In the net revenue account, the balance on the year's working is stated at £101. At the beginning of the past year, the amount set aside for the sinking fund was £60,554, and during the year there was added £5426; bringing the fund up to £65,980. The amount of the sinking fund applied, inclusive of £21,228 which had been utilized previous to the past year, was £59,356; leaving a balance of £6624. The reserve fund shows a credit balance of £5533. The total liabilities of the department amount to £209,616, and the assets to £269,871—showing a surplus of £60,255. During the previous year, 21,616 tons of coal were carbonized, the average price of which was 10s. 0·5d. per ton—the lowest price on record. Last year, 22,866 tons of coal were carbonized, the average price of which was 11s. 15·18d. per ton. The quantity of gas manufactured last year was 226,553,000 cubic feet—an increase of 5,975,000 cubic feet. The receipts from the sale of gas were £31,763, as compared with £31,039 in the previous year.

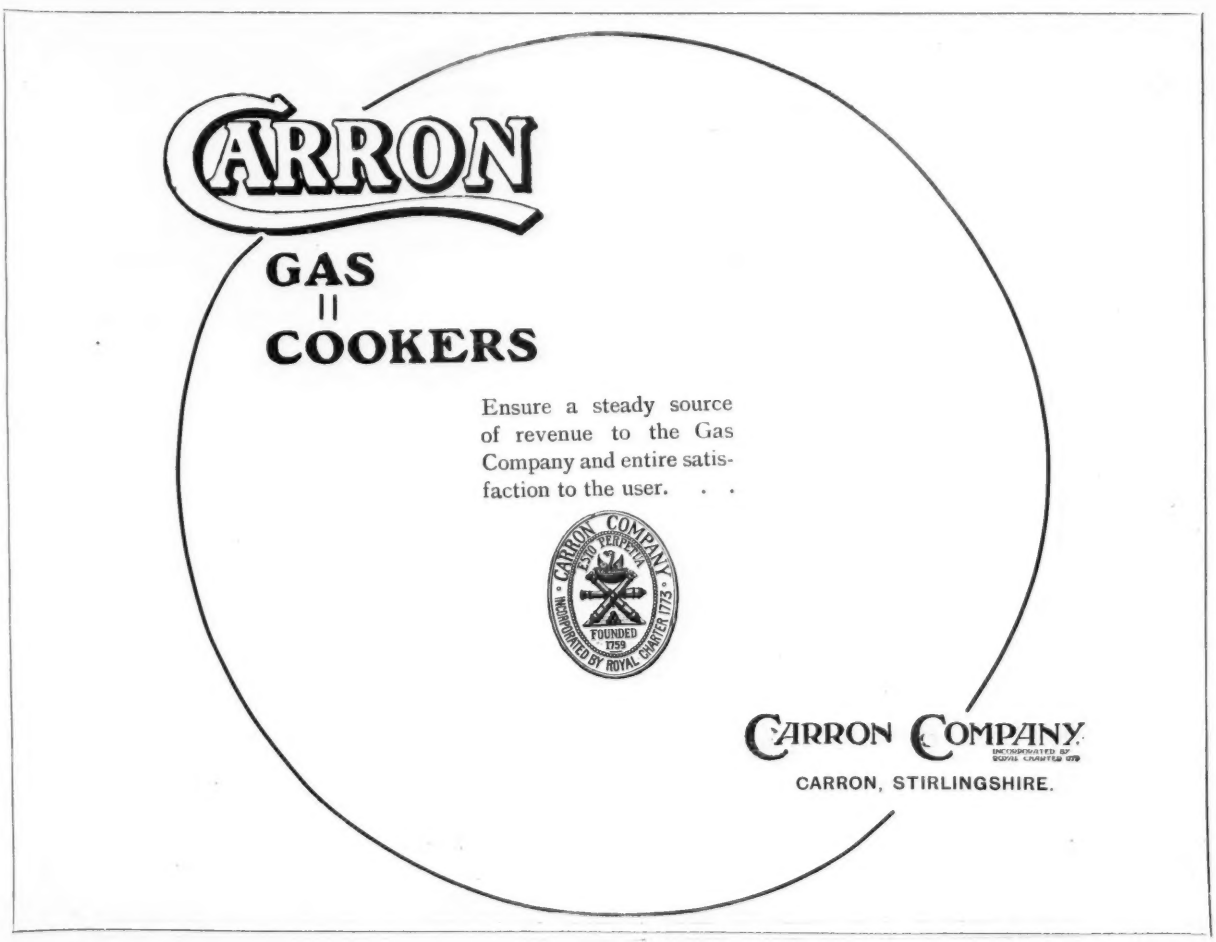
An alleged fault in the station meter was the subject of discussion at the monthly meeting of the Greenock Town Council on Tuesday. In presenting the minutes of the Gas Committee, Bailie Chalmes said they showed an increase of 32 million cubic feet as compared with the previous year; but he explained that, as was shown elsewhere, the increase was more apparent than real, because the special test meter had been found to be 3·9 per cent. fast, which reduced the increase to 18 million cubic feet. Mr. Mitchell pointed out that the new station meter was obtained a few years ago, and said he considered it extraordinary that it should be wrong. The makers should have been informed of it. The Corporation had been living in a Fool's Paradise during the year, because they had been anticipating an income from the 32 million cubic feet increase; whereas they would have it from 18 millions only. This might also disappear when they got the balance-sheet. It was a most unfortunate state of matters, and he considered it not at all creditable. Mr. M'Callum thought it was rather astounding to hear Bailie Chalmers and the Manager trying to show that the meter was not quite correct at the end of the year's working. This information should be given when they got the financial results. Bailie Chalmers explained that the minute was preparing them for the financial statement. He was not aware of the situation till the Manager presented his statement at the last monthly meeting. The subject then dropped.

The report to the Corporation of Falkirk by Mr. W. Wilson, the Gas Engineer and Manager, submitted this week, states that for the year ending May 15 the quantity of gas made was 196,370,000 cubic feet, as compared with 200,445,000 cubic feet in the preceding year—a decrease of 4,075,000 cubic feet. The gas sent out was 3,867,300 cubic feet less—equal to 1·92 per cent. Gas accounted for last year amounted to 171,974,800 cubic feet—an increase of 287,800 cubic feet; and the gas unaccounted for was 24,396,900 cubic feet, equal to 12·42 per cent., as compared with 14·34 per cent. the previous year. The coal carbonized amounted to 21,380 tons, as compared with 22,280 tons. The average yield of gas per ton of coal was 9184 cubic feet, as compared with 8996 feet. There was a decrease in the number of ordinary consumers of 90, and an increase of 304 prepayment meter consumers. The total number of consumers on May 15 was 9435—4780 ordinary and 4655 prepayment. During the year there was an increase of 479 in the cookers in use; the number now on loan being 2146.

Mr. R. W. Russell presided at the annual meeting of the Selkirk Gaslight Company last week. The report of the Directors submitted stated that the quantity of gas made during the year ending April 30 was 40,492,500 cubic feet—an increase upon the preceding year of 2,469,000 cubic feet. Gas accounted for amounted to 37,338,500 cubic feet. The quantity of coal carbonized was 4029 tons; and the yield of gas was 10,174 cubic feet per ton. In order to provide additional storage accommodation, the Directors had enlarged an existing gasholder. The damage caused by the explosion in the works in March last amounted to nearly £86. It was, however, covered by insurance; and the buildings had been renewed. The profit for the year amounted to £1359. The Directors recommended a dividend of 4 per cent., that £250 be allowed for depreciation, that £384 be carried forward, and that the price of gas remain unchanged. In the balance-sheet, the share capital was stated at £18,140, and the value of the works at £18,864. The total revenue during the year was £6070, of which £4671 was derived from the sale of gas. The expenditure was £4711. The report was adopted, and Mr. Russell was elected Chairman of the Company, in room of the late Mr. G. Roberts, who held the position for many years.

It was reported to the Finance Committee of the Dundee Town Council on Thursday that it had been the practice to pay *ad valorem* duty on the purchase of gas annuities, but that a change had now been made. Originally the amount of the gas annuities was £8662 10s., and their nominal value £216,562 10s. Previous to April 30 last, annuities to the value of £2549, and of the nominal value of £63,748, had been redeemed. It had been the practice to pay an *ad valorem* duty of 10s. per cent. Negotiations with the Inland Revenue authorities were entered into by the Town Clerk, with the result that the duty is to be no longer exacted. This will mean altogether a saving of £1500. The Finance Committee expressed their satisfaction with the action that had been taken.

The Helensburgh Town Council held a special meeting on Thursday, to hear a report by a Special Sub-Committee as to extensions at the gas-works. The report was submitted by Bailie Mitchell, the Convener. The recommendation of the Committee was to adopt the Glover-West system of vertical retorts. It was stated that the Sub-



Committee had visited St. Helens, and they were satisfied with their inquiries and with the opinions they had got from experts. Including additional ground, new coal-store, siding at the railway station, and railway into the works, the total estimated cost was £14,711. Bailie Mitchell said the constructors gave a guarantee that each retort would carbonize 2¾ tons of coal per day, and that the same quantity of gas would be got out of 5000 tons of coal under the new system as was obtained from 6000 tons under the present system. They also claimed that there would be an entire absence of fumes, smoke, or nuisance of any kind. The installation would be the first of the kind to be erected in Scotland. The recommendation of the Committee was adopted unanimously, and they were authorized to accept estimates and to proceed with the work.

At the recent annual general meeting of the Montrose Gas Company, the Engineer and Manager (Mr. A. Mackay) submitted his report, which showed that upwards of 33 million cubic feet of gas had been made during the year—an increase of fully 600,000 cubic feet compared with the preceding twelve months. Meters to the number of 447 had been fixed, of which 128 were for new consumers. The number of gas cookers, &c., put in was 370. The balance-sheet showed a profit, after allowing for depreciation, of £1281. It was unanimously agreed that a dividend of 50s. per share should be paid.

The revenue of the Annan Gas Company, Limited, for the past year amounted to £3804, and the expenditure to £3050; leaving a surplus of £754, out of which a dividend of 7 per cent. has been paid.

The Berwick and Tweedmouth Gas Company earned a profit last year of £1213, and have paid a dividend of 10 per cent.

The Brechin Gas Company, Limited, had a profit upon last year's working of £2002, exclusive of a balance of £17 brought forward. There had been paid as dividend on preference shares £235, written off as bad debt £16, allowed for depreciation on works £440, and as a proportion of the cost of new gasholder £100; leaving a net balance of £1228. The Directors recommended that a dividend of 7½ per cent. be paid, and that, subject to such remuneration as might be voted to them, £103 be carried forward. At the annual meeting on Wednesday, these recommendations were adopted. The Chairman—Mr. J. Guthrie, J.P.—said that, as hinted at the meeting last year, the dividend had been increased by 1s. per share. The gas consumed last year amounted to 28 million cubic feet—an increase of half-a-million cubic feet. As compared with the previous year, there had been a saving of £80 on their coal bill; but as a set-off against this, their taxation had increased by a similar sum. The Directors were voted £75 for their services during the year.

From newspaper reports, it appears that fire-guards for gas-stoves were recommended by the Wimbledon Coroner at an inquest on a little girl who was burned to death through her dress catching the lighted jets of the stove while she was washing her doll's clothes. The Coroner added that it was curious that there should be a disposition to censure people who did not provide fire-guards for open grates, when the tendency to-day was so largely to use gas-stoves.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 23.

Sulphate of Ammonia.

At the commencement of this week there was an easy market, but towards the close improved demand set in, and this brought about a firmer tone. Values, however, do not to-day exceed those of last week—viz., £11 15s. per ton f.o.b. Hull, £11 16s. 3d. f.o.b. Liverpool, and £11 17s. 6d. f.o.b. Leith. In the forward position, further transactions are reported to have taken place at an advance of 2s. 6d. per ton on current prices, but consumers for the most part are unwilling to pay the premium required.

Nitrate of Soda.

The quotations for this article have again been reduced, and they are now 9s. 1½d. per cwt. for ordinary and 9s. 3d. for refined quality, on spot.

LONDON, *July* 25.

Tar Products.

Markets for tar products have been very quiet throughout the past week. Pitch is unchanged. Business is still very difficult to transact on the Continent, as buyers are confident that, by waiting, they will secure lower prices. Business has been done on the east coast at 33s. per ton. On the west coast, rather better figures have been talked of; but it is impossible to find that any business has been done. Creosote remains steady. Further orders, however, are scarce. Business in benzol is quiet; but there has been no further fluctuation in price. Solvent naphtha is quiet, and in some cases buyers are looking for lower prices. In crude carbolic acid, business is again at a standstill.

The average values during the week were: Tar, 15s. 9d. to 19s. 9d., *ex* works. Pitch, London, 33s. to 34s.; east coast, 32s. 6d. to 33s.; west coast, 31s. 6d. to 32s. 6d. f.a.s. Mersey ports. Benzol, 90 per cent., casks included, London, 6¾d. to 7¼d.; North, 6d. to 6½d.; 50-90 per cent., casks included, London, 7¾d.; North, 7d. to 7¼d. Toluol, casks included, London, 10d.; North, 9d. to 9½d. Crude naphtha, in bulk, London, 3¼d. to 3⅜d.; North, 3¼d. to 3½d.; solvent naphtha, casks included, London, 1s. 2d. to 1s. 3d.; North, 1s. 2d. to 1s. 3d.; heavy naphtha, casks included, London, 11d. to 1s.; North, 10d. to 11d. Creosote, in bulk, London, 2¼d. to 2⅜d.; North, 2d. to 2¼d. Heavy oils, in bulk, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., casks included, west coast, 1s.; east coast, 1s. 0½d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 42s. 6d., bags included. Anthracene, "A" quality, 1½d. per unit, packages included and delivered.

Sulphate of Ammonia.

The price of this article has been steady throughout the past week, and there has been little buying. No doubt this is covering-in for the month's requirements; but, on the whole, the prices have not actually changed. To-day, on Beckton's new terms, the price is £11 10s. Outside London makes are £11 5s. to £11 6s. 3d.; Leith, £11 17s. 6d.; Hull, £11 15s.; Liverpool, £11 15s. to £11 16s. 3d.; and Middlesbrough, £11 15s.

DAVIS'S

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with

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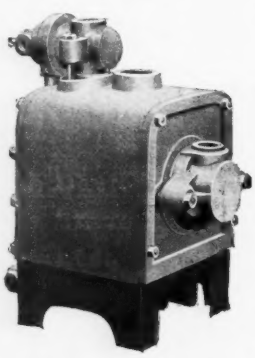

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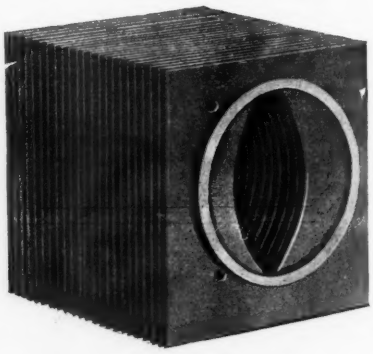

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LUTON.

Show-Rooms: 59, Queen Victoria Street, E.C.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade has been greatly disturbed by the railway strike. For some days the quantity of coal sent out has been decreasing, until at last it consisted only of that which was shipped direct, and passing over private lines. Under such circumstances, prices are nominal, and are based on from about 10s. per ton f.o.b. for best Northumbrian steams, 9s. to 9s. 3d. for second-class steams, and 5s. 6d. to 6s. 9d. for steam smalls. In the gas-coal trade, the condition was also rather serious, production being small, because of the inability to get quantities away. Durham gas coals are nominally from 9s. to 9s. 9d. per ton f.o.b. for the usual classes, according to quality, and up to 10s. 6d. for Wear specials; but these prices are also nominal, though the situation has been altered, and the working of the collieries is now recommencing. Production has been checked, and there will be some little leeway to make up. Consumption must now be expected to increase as the days shorten; while the fuller trade should enlarge the demand for gas coal. As to coke, the market is steady. Gas coke is still rather scarce, with prices varying from about 14s. to 14s. 6d. per ton f.o.b. in the Tyne for good quality.

Scotch Coal Trade.

On account of the summer holidays, business was suspended; and there is no market report. Coal exports amounted to 345,896 tons for the week—an increase upon the preceding week of 23,026 tons, and upon the corresponding week of 8748 tons. For the year to date, the total shipments have been 8,628,821 tons—an increase upon the corresponding period of 615,408 tons.

Gas v. Electricity for Lighting Large Halls.—The Baths Committee of the Lewisham Borough Council invited estimates from the South Metropolitan Gas Company and the South Metropolitan Electric Light Company for improving the lighting at the first-class hall in the baths at Ladywell when used for entertainments during the winter months. The estimates were duly received, and the Borough Surveyor had personal interviews with representatives of both Companies on the subject. The Gas Company offered to supply and fix in approved positions nine of Sugg's "Swanley" inverted lamps, each having a lighting efficiency of 520 candles, such lamps to be removed and the existing installation reinstated by them free of all cost if not approved, but if retained the Company to be paid the sum of £29 10s. The Electric Light Company gave an outline of their scheme for lighting the hall with fourteen 100-candle power metallic filament lamps suspended from the existing tie-rods, occupying approximately the same position as the double gas-pendants now in use, at a cost of £37, together with all lamps, main fuses, switches, and shades. The Committee have accepted the offer of the Gas Company.

Quality of London Water.

At the last meeting of the Metropolitan Water Board, the fifth report of the Director of Water Examinations (Dr. A. C. Houston) was presented. It showed that the microbes of epidemic waterborne disease cannot be uniformly present in the new Thames and Lea water unless in very small numbers. The Water Examination Committee, commenting on the report, said: "From the practical point of view, this report is perhaps the most interesting and convincing of the series, for it shows how the whole supply can be under supervision previous to filtration. Since with more than 160 filter-beds in use, supplying water at the rate of upwards of 200 million gallons a day, it is obviously impossible to test the output from each filter even once in the 24 hours, it follows that water is constantly going into supply, the purity of which has not been actually established by tests. To cover this point, the pre-filtration method of examination has been elaborated. Representative samples of all the water antecedent to filtration are now examined bi-weekly. Owing to the remarkable equalizing effect of storage, this is almost equivalent to determining constantly the quality of the water supply previous to filtration. The results show, in the most convincing manner, that London is not really drinking filtered raw river water, but water which antecedent to filtration has undergone a remarkable transformation for the better. We regard this pre-filtration check on the quality of the Metropolitan Water Supply as of paramount importance."

Holyhead Water Supply.—At a special meeting of the Health Committee of the Holyhead Urban District Council, Dr. Clay, the Medical Officer of Health, reported that he had received a report of a bacteriological examination of a sample of water taken from Kingsland on July 4; and it was unsatisfactory. The Committee appointed a deputation to wait upon the Holyhead Water-Works Company, and lay the matter before them, and to request that the pumping of the Trafwll water, which is the source of the supply to the town, should be stopped pending immediate steps being taken to secure proper filtration. Subsequently a special meeting of the Council in committee was held, when the deputation reported that they had interviewed Mr. J. C. Lawfield (the Secretary of the Water Company), who intimated that the Directors were all away from home, and he had no means of communicating with them; and that he could not, upon his own responsibility, cease pumping the water, as requested by the Council. Dr. Clay further reported that, owing to the unsatisfactory nature of the report, he had advised that circulars should be issued to all the householders suggesting the advisability of boiling the water before it was used for domestic purposes. The Council then decided, after fully discussing the matter, that a letter of complaint be sent to the Secretary calling upon the Company to supply pure and wholesome water to the town, and stating that in default the Council would send a copy of the Analyst's report to the Local Government Board, and take proceedings, under the Company's Act, for the appointment of an Arbitrator, and, if necessary, recover by penalties. The reports have been adopted by the Council.

RICHMOND'S PLATE RACK, WALL PLATE AND HOOD.

¶ THE usefulness of the Rack for plate-warming, or for the accommodation of dishes when "dishing-up"—in fact, for several purposes while cooking is in progress—is apparent. It can be folded back out of the way when not in use. The white enamelled back plate is removable by hand and is for the protection of wall and to prevent splashings from cooking on cooker Hotplate. The Hood gives a "completeness" to the Cooker and carries away fumes, as well as conserves the heat.

HIRED OUT BY MANY GAS COMPANIES.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.

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Presentation to a Bolton Corporation Gas Official.

Mr. Robert Baker, the Superintendent of the Bolton Corporation Gas and Electricity Fittings Department, has just been the recipient of a gold hunter watch, subscribed for by the employees of the department, as a mark of esteem on the attainment by him of his twenty-first anniversary as Superintendent; a gold brooch, set with diamonds, being a gift from the same source to Mrs. Baker. The presentation was made on the occasion of the recent annual outing of the employees in the department, when the party included Mr. W. Webster, the Chairman of the Gas Committee, and Alderman Miles, J.P., a former Chairman. In the course of his speech, Alderman Miles called attention to the development of the department under Mr. Baker's control. In 1889, when he took over the duties as Superintendent, they had twelve fitters, six assistants, and two clerks; and during that year they fixed 147 cookers and 142 grillers. For the official year just ended, they had a staff of 58 fitters, 7 labourers, a carpenter, 29 assistants, and 12 clerks; and in the twelve months 471 cookers and 3387 grillers had been fixed. The gifts were presented by Mr. Webster, who paid a tribute to Mr. Baker for the way in which he had discharged the duties of his office.

Gas to Replace the Electric Light.—The members of the Haslingden Town Council, at their monthly meeting last Wednesday, acceded to the request of the Outfall Sewage Board that the road leading past the sewage works at Ewood Bridge should be lighted by gas instead of by the electric lamps previously used; and it was resolved that the Chairman and Vice-Chairman of the Lighting Committee should be deputed to see to the erection of lamp-pillars for lighting the road.

Liability for Damage to Street-Lamps.—At a recent meeting of the Stepney Borough Council, they were reminded that the Works Committee in January last brought to their notice a communication received from the Town Clerk of Kensington, intimating that the Council of that borough were unable to recover a large proportion of the money expended on repairing street-lamps damaged in the borough, owing to the fact that they could not look to the owner of any vehicle causing the damage for the cost of repairing it, but only to the driver of the vehicle—he being the person responsible within the meaning of section 207 of the Metropolis Management Act, 1855. The Stepney Council resolved to support a request addressed by the Kensington Borough Council to the London County Council that that authority would insert a clause in one of their General Powers Bills having for its object the amendment of the Metropolis Management Act. The Committee now reported that they had had submitted to them a communication from the Clerk of the London County Council, intimating that the following resolution had been passed: "That legislation be promoted in the session of Parliament of 1911 to extend the provisions of section 207 of the Metropolis Management Act, 1855, so as to make liable for such damage the owner as well as the driver of a vehicle causing damage to any property erected in streets and belonging to the Council or to a local authority."

The South Hants Water Bill.

The Southampton Borough Council, at a special meeting on Monday of last week, adopted a report of the Parliamentary Committee, which contained the following items: The Town Clerk reported that the Bill promoted by the South Hants Water-Works Company had been heard by a Committee of the House of Commons, who had passed the Bill, subject to certain modifications, and had not inserted the clauses asked for by the Corporation with reference to the second well sunk by the Company at Twyford, and for the purpose of suspending the operation of the Bill pending the promotion of a Bill by the Corporation next year for the purchase of the undertaking; and that, in view of the decision of the Committee of the House of Commons, he had conferred with Counsel as to the further steps to be taken with reference to the Bill. It was resolved: (1) That the Bill be opposed by the Corporation in the House of Lords; and (2) that the Town Clerk and his Parliamentary Agents do prepare the necessary petition, and that the Corporate seal of the Corporation be affixed thereto. On July 11, the Sub-Committee reported as follows: The Sub-Committee beg to report that, as a result of the opposition by the Corporation to this Bill before the Select Committee of the House of Commons, the capital authorized to be raised was reduced to £60,000, with borrowing powers of one-fourth (£15,000), and that the Select Committee expressed and placed on record the following opinion: "That the Committee, realizing that the Company and the Corporation are drawing from the same source of supply, think that in the general interests of the community certainly the water supply should be under the control of one authority, but do not express any opinion as to the composition of the said authority." The Select Committee did not insert any clause limiting the amount of water to be taken from the wells at Twyford. The Bill as amended in the House of Commons was considered by a Select Committee of the House of Lords, and there opposed on behalf of the Corporation, when the Committee inserted a clause limiting the amount of water to be pumped at Twyford to 2½ million gallons per diem.

As the result of the initiative of Mr. Matt. Dunn, the Superintendent of the Stockton-on-Tees Gas-Works, the senior boys at Elmfield College, York, where Mr. Dunn's son is a pupil, were enabled a short time since to visit the York Gas-Works. The party consisted of 35 of the boys, and, headed by the Science Master (Mr. Willott) they made the inspection under the guidance of Mr. Dunn, who devoted the afternoon to showing them over the works, and enlightening them upon the manufacture of gas and the measurement of its illuminating power. At the close, a vote of thanks was accorded to Mr. Dunn for his explanations; and the kindness of Mr. Hill, the Engineer, Manager, and Secretary of the York Gas Company, in freely throwing open the works to inspection, was also acknowledged. An account of the visit is contained in the "Elmfieldian" (the College magazine) for June, from which we learn that Mr. Dunn is to give the pupils a lecture on the history of artificial light some time during the coming winter.

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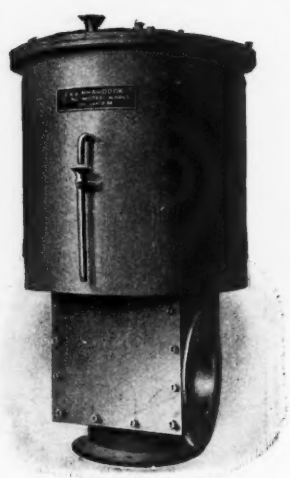

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Burst of a Water-Main.—The Cardiff 20-inch water-main burst at Abercanaid last Saturday, flooding the Merthyr-Cardiff road two miles below Merthyr, and rendering it impassable for traffic. Before the Cardiff supply can be resumed, the main will have to be repaired; and a large number of workmen were put on to the job as quickly as possible.

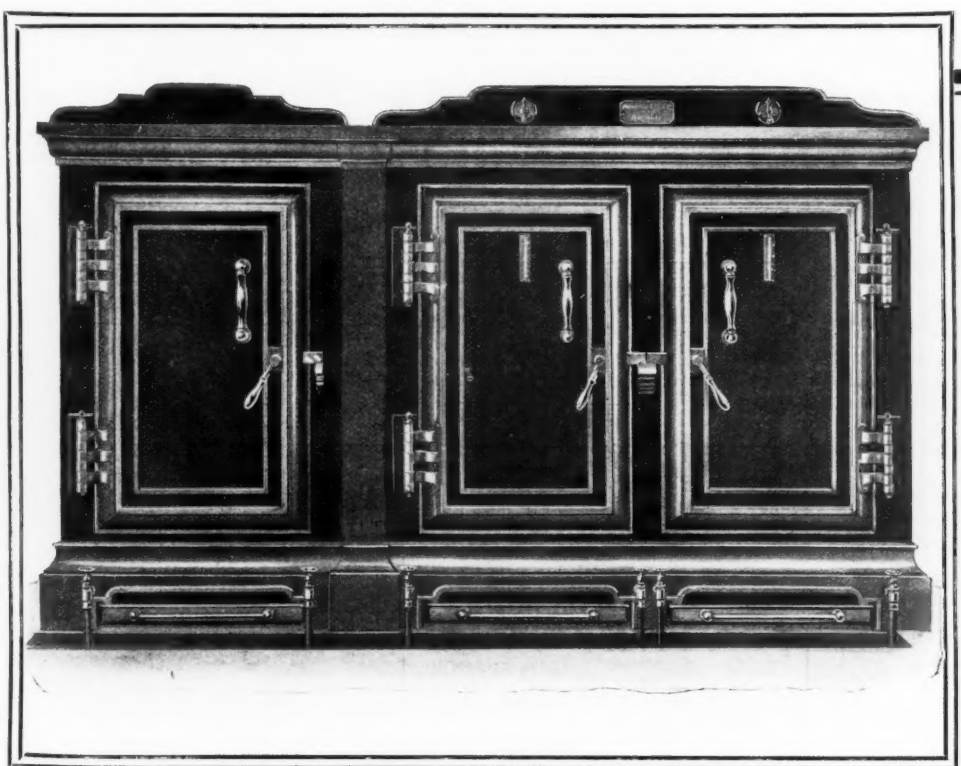
Birmingham Public Lighting.—In the course of an article on the government of Birmingham, the local "Daily Post" says that in its responsibility for the lighting of the city, the Public Works Department has at present to maintain over 14,000 lamps. The whole of the lamps are fitted with incandescent burners; and there are 158 fitted with inverted burners. The expenditure on public lighting works out at £1 12s. 11¼d. for each of the 16,342 burners in the lamps. The consumption of gas has been greatly economized by the adoption of the incandescent burner; while the lighting power has been considerably increased. The actual reduction in the amount of gas used per burner was at first almost balanced by an increase in the number of burners; but as showing the economies which are now effected with the improved lighting arrangements, it may be stated that in 1861 the maintenance of each of the then existing 3678 public lamps cost £3 10s. In 1884, there were 6892 public lamps, each of which cost £2 5s. 7¾d. for upkeep. During recent years, with more than 14,000 lamps, the expenditure on each has averaged no more than £1 17s. per annum.

Gas at Birmingham Workhouse.—As the result of the consideration of the question of the Birmingham Workhouse and Infirmary being supplied with gas by the Corporation, instead of manufacturing it at the Union gas-works, the Engineering Sub-Committee recommended that the present system should be continued; and consequently the Management Committee decided to ask the Board to continue manufacturing their own gas for the present, a course which was duly agreed to. It was explained that the Corporation offered to supply the Guardians with gas at 1s. 4d. per 1000 cubic feet net; but, in addition, there were certain things to be done by the Board which would increase the expense to 1s. 6d. At the workhouse they were producing gas at 1s. 4¾d. per 1000 feet. The workhouse-made gas answered its purpose well; and there was the further fact that the gas-works were in good order, and would not necessitate any outlay upon them for two years at least. Mr. Pentland said they were told that the Corporation could make and sell gas at 1s. 4d. per 1000 cubic feet. As they charged over 2s. per 1000 feet, was it, he asked, surprising that they could give £50,000 to the relief of the rates? Mr. Turner expressed the view that if a poor-law authority elected to manage a workhouse could not make a profit on a commercial undertaking, it was wise to abandon it, and take a supply from a concern which was manufacturing a larger quantity and a better article. The Infirmary Committee had complained of the quality of the gas. He regarded the Corporation offer of 1s. 4d. per 1000 cubic feet in bulk as being favourable. Mr. Crump, however, pointed out that, as the gas-works were remunerative, it was most important that they should be continued, as they found work for inmates.

APPLICATIONS FOR LETTERS PATENT.

16,412.—Brown, W., "Swing ring for mantle." July 9.
16,414.—Kewney, A. L., "Pipe and expansion joint." July 9.
16,503.—Breuning, R. & E., and Baertschi, O., "Self-closing gas valves and cocks." July 11.
16,520.—Shaw, E. J., "Wall-brackets." July 11.
16,567.—Peters, C., "Gas-cooker rings." July 11.
16,579.—Parkinson and W. & B. Cowan, Ltd., and Cheshire, W., "Gas-meters." July 12.
16,589.—Winklemann, G. E., "Gas-ovens." July 12.
16,596.—Burstall, F. W., "Removing tar and other suspended matter from gases." July 12.
16,625.—Palmer, W. V., "Prepayment meters." July 12.
16,630.—Woodall, H. W., and Duckham, A. M'D., "Vertical retorts." July 12.
16,631.—Duckham, A. M'D., "Delivery of products from gas-retorts." July 12.
16,642.—Saul, D. H., "Gas cocks or valves." July 12.
16,656.—Rostin, H. P., "Lighting gas." July 12.
16,677.—Cuss, C. T., "Incandescent gas lighting, heating, and power." July 13.
16,725.—Woodall, H. W., and Duckham, A. M'D., "Brick for heating flues." July 13.
16,738.—Kirkby, R., "Gas-engines." July 13.
16,745.—Hydes, T., "Gas stoves and rings." July 13.
16,769.—Smith, A., "Heat-retaining device." July 13.
16,801.—Helps, G., "Joints for pipes." July 14.
16,968.—Allen, E., and Co., Ltd., Ogilvie, A., and Short, A. A., "Conveyors and screens." July 16.
16,984.—Dunlop, J., "Gas-producers." July 16.
17,011.—Deutsche Gasgluhlicht Akt.-Ges. (Auergesellschaft) "Lamps or lanterns." July 16.
17,015.—Drumgold, C. T., "Globe supports." July 16.

Unprofitable Electricity Supply in Bermondsey.—At the meeting of the Bermondsey Borough Council last Tuesday, the Finance Committee submitted a report drawing the Council's "very serious attention" to the fact that on the year's working of the electricity undertaking a surplus of only £43 was shown for an outstanding loan indebtedness of £152,970. The Committee expressed the opinion that this result is partly due to the very low price at which energy is now being sold; and they felt it their duty to warn the Council to be very careful as to how the undertaking is managed in the future, more especially with regard to incurring further liability by way of loan. In conclusion, the Committee said next year's surplus was estimated at £660; but they doubted whether any such amount as this would be realized.



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Reduction in Price at Ramsbottom.—The Directors of the Ramsbottom Gas Company announce a reduction in the price of gas by 2d. per 1000 cubic feet, with special terms for use for other purposes than lighting.

Manchester Gas Committee's Coal Contracts.—Tenders for the supply of coal required at the several gas-works of the Manchester Corporation during the ensuing twelve months were considered at a meeting of the Gas Committee last Thursday. Orders were placed for about 400,000 tons, at a price a little in excess of last year. Alderman Gibson, the Chairman of the Committee, when asked about the prices, said it was not considered wise to give details; but, having regard to the state of the market, he was of opinion that the Committee had secured very favourable terms. About 25 firms, he added, would share the orders; and the prices generally were a few halfpence more per ton than was paid last year.

Vertical Retorts for the Dronfield Gas-Works.—The Vertical Gas-Retort Syndicate have secured a contract for a small installation of vertical retorts, consisting of one bed of four 4-metre (13 feet) retorts, at the Dronfield Gas-Works. The fact will have special interest for the managers of small gas-works.

Messrs. Leech, Goodall, and Co., of Hunslet, Leeds, have received an order from the Micklefield Coal and Lime Company for screening plant, including tipplers, picking-belts, jiggers, conveyors, structural work, &c., in connection with the new sinking at their colliery.

Goodwin Clarke, a Wakefield man, was found by his wife dead on a sofa, with a tube in his mouth attached to a gas-bracket, which was turned on. At the inquest, the Jury returned a verdict to the effect that deceased committed suicide while of unsound mind, probably owing to his wife's illness and financial matters.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

DRAUGHTSMEN. No. 5268.
REPRESENTATIVE. No. 5279.
REPRESENTATIVE. "Gas-Works," c/o Streets, Cornhill.
CLERK. No. 5270.
FITTER. Leigh-on-Sea Urban District Council. Applications by Aug. 2.

Situations Wanted.

IN GAS OR WATER CONCERN. No. 5265.
MANAGER OR SECRETARY, &c. No. 5267.

Plant (Second-Hand) for Disposal.

PURIFIERS, &c. Malvern Urban District Council.
RETORTS, &c. Hastings and St. Leonards Gas Co.
WASHER-SCRUBBER. Newark Gas Company.

Meetings.

GASLIGHT AND COKE COMPANY. Chief Office, Aug. 5, Twelve o'clock.
COMMERCIAL GAS COMPANY. Cannon Street Hotel, Aug. 11, Twelve o'clock.
BRENTFORD GAS COMPANY. St. Ermin's Hotel, Aug. 5. 2.30 o'clock.
BROMLEY AND CRAYS GAS COMPANY. Gas-Works, Aug. 4, Six o'clock.
SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel, Aug. 5, Three o'clock.

TENDERS FOR

Coal and Cannel.

BARRY URBAN DISTRICT COUNCIL. Tenders by Aug. 6.
CLACTON URBAN DISTRICT COUNCIL. Tenders by Aug. 3.
HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD. Tenders by Aug. 8.
STRETFORD GAS COMPANY. Tenders by Aug. 3.

Coke (Wanted). No. 5264.

Meters.

DEWSBURY GAS DEPARTMENT, Tenders by Aug 6.

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DEWSBURY GAS DEPARTMENT Tenders by Aug. 6.
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Sulphuric Acid.

DEWSBURY GAS DEPARTMENT. Tenders by Aug 6.
HEYWOOD GAS DEPARTMENT. Tenders by Aug. 8.

Tinned Goods.

HEYWOOD GAS DEPARTMENT. Tenders by Aug. 8.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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In consequence of the BANK HOLIDAY, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office

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SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: Oldbury, Wednesbury, and Stafford.
Address Correspondence and Inquiries to Oldbury, Worcs.
Telegrams: "Chemicals, Oldbury."

F. BOYALL, Contractor for Painting GASHOLDERS, OIL-TANKS, ROOFS, and all kinds of LOFT and other PAINT WORK.
70, Balcorne Street, Well Street, Hackney, N.E.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

LUX'S GAS PURIFYING MASS.
See Advertisement on First White Page.
Friedrich Lux, Ludwigshafen-am-Rhein.

BRISTOL RECORDING GAUGES AND THERMOMETERS.
J. W. & C. J. PHILLIPS, 28, College Hill, London, E.C., and 25, Bridge End, Leeds.

SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, June 21, p. 914.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury.

IT is Worth Your While to Buy Direct.
The RELIANCE LUBRICATING OIL COMPANY supply the best value in NON-CORROSIVE LUBRICANTS—viz., Motor Waggon Oil, 1s.; Motor Car Oil, 2s.; Engine, Cylinder, and Machinery Oils, 1s.; Axle Oil, 10½d.; Exhauster Oil, 10d.; Special Cylinder Oil, 1s. 4d.; 650 T Cylinder, 2s.; Special Engine Oil, 1s. 4d.; Gas Engine and Oil Engine Oil, 1s. 6d.; Refrigerator, 1s. 9d.; Renown Engine Oil, 11½d.; and Astral Disinfectant, 2s. 6d. per gallon. Barrels free, carriage paid. Solidified Oil, 25s. cwt.
The Reliance Lubricating Oil Company, 19 & 20, Water Lane, Tower Street, London, E.C.

JOHN W. LEITCH AND COMPANY,
MILNSBRIDGE CHEMICAL WORKS,
near HUDDERSFIELD.
The Manufacture of
PURE BENZOL for GAS ENRICHMENT
a speciality.

KRAMERS AND AARTS WATER-GAS PLANT.
K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

AMMONIA.
Consumers in any form are invited to correspond with Chance and Hunt, Ltd., Chemical Manufacturers, Oldbury, Worcs.

GAS TAR wanted,
Brotherton and Co., Ltd., Tar Distillers.
Works: Birmingham, Glasgow, Leeds, Liverpool, Sunderland, and Wakefield.

AN experienced Water-Works Manager and Secretary requires an Appointment in either Capacity. Would not object to a small Water-Works, or to Act as PRIVATE SECRETARY to an Engineer or Professional Gentleman, also willing to Travel as Representative for any Manufacturers of Water-Fittings, Meters, Pressure Gauges, &c.
Address No. 5267, care of Mr. King, 11, Bolt Court Fleet Street, E.C.

GENTLEMAN, for some Years Connected with a Water Company now absorbed by Municipality, SEEKS OCCUPATION with either a Gas or Water Concern. Thoroughly Acquainted with the whole of the Official Work, Registration, Accounts, and Rating. Good Organizer. Excellent Testimonials and References as to Abilities and Character. Small Initial Salary accepted with prospect of advance on work proving satisfactory.
Address No. 5265, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

REPRESENTATIVE required to introduce and push important article used in all Gas-Works. Must have Good Connections and be good Salesman.
Please write, stating Qualifications, District, and References, to: "Gas-Works," care o Streets, 30, Cornhill, E.C.

WANTED by a Firm of Ironfounders and Chemical Engineers, with Established Trade among Chemical Manufacturers, to undertake the Sole Rights of Making and Selling Chemical Specialities in Great Britain.
Apply No. 5262, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, immediately, Two or Three DRAUGHTSMEN, fully Experienced in the Design of Modern Gas Plant.
Apply, by letter, Stating Age, Qualifications, and Salary required, to No. 5268, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

URBAN DISTRICT COUNCIL OF LEIGH-ON-SEA.
(Gas-Works).

WANTED, an Experienced Fitter, with a thorough knowledge of Gas Machinery and Gas Making. Age not to exceed 40 Years.
Salary commencing at 35s. per Week.
Applications, marked "Fitter," stating Age and previous Experience, and enclosing *copies* of Three recent Testimonials, must be forwarded to the undersigned so as to be received not later than Eleven o'clock a.m. on Tuesday, the 2nd day of August, 1910.
Canvassing, personal or otherwise, will disqualify.
By order,
W. Carlyle Croasdell,
Clerk to the Council.
Council Offices, Leigh-on-Sea,
July 21, 1910.

AN Old-Established Firm requires thoroughly competent and capable REPRESENTATIVE for Gaslight Fittings Department. Must be Experienced and well-known among Gas Companies, and resident in London.
Apply, by letter, to No. 5269, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, a Clerk in the Office of the Secretary of a Country Gas Company about 20 miles from London, to keep the Accounts under Supervision. Must have had previous Experience in the Work.
Apply, by letter, stating Experience, Age, References, and Salary required, to No. 5270, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GASHOLDERS—Splendid 45 feet diameter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.
Firth Blakeleys, Thornhill, Dewsbury.

FOR SALE—Kirkham's Patent "Standard" WASHER-SCRUBBER, with ENGINE for driving same.
Capacity, 350,000 cubic feet per twenty-four hours. 12-inch Connections. Cost £314.
For Price and further Particulars, apply to the Newark Gas Company.

FOR Disposal—10-H.P. Portable Steam-ENGINE, practically new, by Marshall and Sons, Gainsborough, insured by National (90 lbs. pressure). 4-H.P. Horizontal STEAM-ENGINE, 5-H.P. Horizontal STEAM-ENGINE BOILER TANK, ⅜ in. Plate, capacity 3070 gallons, absolutely sound. Cheap. Stationary STEAM CRANE, long jib. Offers Solicited.
W. Johnson, Junr., New Hythe, Kent.

SURPLUS Retorts for Sale, made by Hickman, Stourbridge, 22 in. by 16 in. Oval D; 28 Mouthpiece Sections, 6 ft. 10 in. to 6 ft. 11 in. long; 13 Middle or Plain Sections, 6 ft. 9 in. to 6 ft. 10⅛ in. long.
These Retorts are in Good Condition, and Offers for same are invited, f.o.r. Hastings Station.
Engineer and General Manager, Hastings and St. Leonards Gas Company, Queen's Road, Hastings.

FOR DISPOSAL—Brick Plant complete. Including 400,000 Place and Hard Stock BRICKS, 15s. to 25s. per Thousand f.o.r. Maidstone. 12-H.P. Portable STEAM-ENGINE by Marshall, of Gainsborough, insured 90 lbs. Steam by National, nearly as good as when delivered from Workshops, £140. High-Pressure BOILER, new, insured 200 lbs. Steam. Suitable for 2-Ton Lorry, £20. 4-H.P. Horizontal STEAM-ENGINE, £5. 5-H.P. ditto, £6. Cheap 8-H.P. Portable STEAM-ENGINE £25. Offers solicited.
Full Particulars on Application to Wm. Johnson, Junr., New Hythe, Larkfield, Kent.

PURIFIERS FOR SALE.

THE Malvern Urban District Council are open to receive OFFERS for the following PURIFIERS: Two 16 ft. by 12 ft. by 5 ft.; Four 16 ft. by 8 ft. by 5 ft.; and Two Four-Way Valves and Connections.
Permission to View and further Particulars can be obtained from the undersigned.
The highest or any Tender will not necessarily be accepted.
By order,
W. J. Kendell Baker,
Engineer and Manager.

SULPHATE OF AMMONIA PLANT.

THE Accrington District Gas and Water Board are prepared to receive Drawings, Specifications, and TENDERS for a Modern 3 Tons per day Plant, erected Complete at the Great Harwood Works of the Board. Taylor's Saturator.
By order,
C. Harrison,
Engineer and General Manager.
Offices of the Board:
St. James' Street, Accrington,
July 26, 1910.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the Supply of TUBES and FITTINGS, SULPHURIC ACID, and TINNED GOODS.
Specification and Form of Tender may be obtained upon Application to Mr. W. Whatmough, Gas Manager.
Sealed and endorsed Tenders to be sent to me not later than Nine a.m. Monday, Aug. 8, 1910.
By order,
Geo. G. Bouchier,
Town Clerk.
Municipal Buildings, Heywood,
July 20, 1910.

TENDERS are invited for a Twelve Months' Supply of Screened GAS COKE for a large Engineering Works in the Midlands (name will be disclosed on Application).
Approximate total Quantity, 725 Tons. Delivery to be taken as required.
Address No. 5264, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

BOROUGH OF DEWSBURY.

THE Gas Committee of the above Corporation invite TENDERS for the Supply and Delivery during the period ending the 31st day of July, 1911, of
SURPHURIC ACID,
WET and DRY METERS,
CAST-IRON GAS and WATER PIPES.
Specifications and Forms of Tender may be obtained on Application to the Gas Manager, Mr. Geo. Wm. Fligg, Gas-Works, Savile Town, Dewsbury.
Tenders, under sealed cover, endorsed "Sulphuric Acid," "Meters," or "Cast-Iron Pipes," as the case may be, to be sent to me not later than the 6th day of August, 1910.
The Corporation do not bind themselves to accept the lowest or any Tender.
H. Ellis,
Town Clerk.
Town Hall, Dewsbury,

STRETFORD GAS COMPANY.

THE Directors of the Stretford Gas Company invite TENDERS for the Supply of Unscreened GAS COALS, NUTS, SLACK, and CANNEL, to be Delivered at the Gas-Works, Stretford, on the Bridgewater Canal, or at Stretford Station (M. S. J. & A. Railway) during the next One, Two, or Three Years, according to the printed Conditions, commencing Sept. 1, 1910.

Tenders to be delivered to the Gas-Works, Stretford, not later than noon on Wednesday, the 3rd of August, 1910, endorsed "Coal," and addressed to the Chairman.

The Directors do not bind themselves to accept the lowest or any Tender.

Forms of Tender and Conditions can be obtained on Application to the undersigned.

By order of the Board,
H. KENDRICK,
Engineer and Manager.

Stretford, July 15, 1910.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

TENDERS FOR GAS COAL.

THE above Board invite Tenders for the Supply of GAS COAL as required by them during the next Twelve Months, at their Gas-Works, Crown Nest, Hebden Bridge.

Tender Forms and Further Particulars may be obtained from Mr. E. J. Wellens, Engineer and Manager, Gas Offices, Carlton Street, Hebden Bridge.

Sealed Tenders, endorsed "Tender for Gas Coal," must be addressed to James Simpson, Esq., Chairman, Gas Board, Offices, Carlton Street, Hebden Bridge, to be delivered on or before Monday, Aug. 8, 1910.

R. CRABTREE,
Clerk to Gas Board.

Gas Offices, Carlton Street,
Hebden Bridge, July 23, 1910.

CLACTON URBAN DISTRICT COUNCIL.

COAL.

THE above Council invite Tenders for the Supply and Delivery of about 5000 Tons of Best Screened GAS COAL in quantities as may be required during the ensuing Twelve Months.

Particulars and Form of Tender may be obtained upon Application to the Consulting Engineer, Mr. Sydney Francis, Assoc.M.Inst.M.E., Town Hall, Clacton-on-Sea.

Tenders, Sealed and Endorsed "Tender for Coal," to be delivered to the undersigned not later than noon on Wednesday, the 3rd of August next.

The Council do not bind themselves to accept the lowest or any Tender.

GEO. T. LEWIS,
Clerk to the Council.

Town Hall, Clacton-on-Sea,
July 19, 1910.

BARRY URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

TENDERS are invited for the Supply of GAS COAL (up to 17,000 Tons), to be delivered in such Quantities and at such times as the Engineer and Manager may require during One Year from August, 1910.

The Tenders must state the names of the Pits from which the Coal will be raised, the names of the Gas-Works at which it is used, and the Price per ton delivered into the Council's Siding at the Gas-Works, Barry, and must be accompanied by a copy of the Analysis of the Coal.

Any person whose Tender is accepted must enter into a Contract in the form required, also a Bond, with approved sureties, for its due performance.

Further Particulars may be obtained from Mr. T. E. Franklin, Engineer and Manager, Gas-Works, Barry.

Sealed Tenders, endorsed "Tender for Gas Coal," must be sent to the undermentioned on or before the 6th of August, 1910.

The lowest or any Tender not necessarily accepted.

T. B. TORDOFF,
Clerk.

Public Offices, Barry,
July 19, 1910.

THE GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Friday, the 5th day of August next, at Twelve o'clock (noon) precisely, to Transact the usual Business, including the Declaration of a Dividend for the Half Year ending on the 30th day of June last.

By order,
HENRY RAYNER,
Secretary.

Chief Office: Horseferry Road,
Westminster, S.W., July 19, 1910.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given, that an ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on Thursday, the 11th of August, 1910, at Twelve o'clock at noon, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th of June, 1910; and to declare a Dividend.

The STOCK TRANSFER BOOKS WILL BE CLOSED from the 29th inst. to the 11th of August, both days inclusive, and the Dividends will be paid on the 1st of September next to the holders of Stock registered at the date of the closing.

By order of the Board,
H. D. ELLIS,
Secretary.

Offices: Stepney,
July 20, 1910.

BRENTFORD GAS COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors will be held at St. Ermin's Hotel, Caxton Street, Westminster, on Friday, the 5th of August next, at Half-past Two o'clock, to transact the usual Business, including the declaration of a Dividend for the Half Year ending the 30th of June last.

By order,
WILLIAM MANN,
Secretary.

Office, Brentford,
July 19, 1910.

SOUTH SUBURBAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the De Keyser's Royal Hotel, Victoria Embankment, London, E.C., on Friday, the 5th day of August, 1910, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June last; to declare a Dividend for the same period; and for General Purposes.

The TRANSFER BOOKS WILL BE CLOSED from the 22nd day of July until after the Meeting.

By order of the Board,
CHARLES M. OHREN,
Secretary.

Offices and Works:
Lower Sydenham, S.E.,
July 18, 1910.

BROMLEY AND CRAYS GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held on Thursday, the 4th day of August, 1910, at Six o'clock p.m. precisely, and on this occasion

AT THE WORKS OF THE COMPANY, IN HOMESDALE ROAD, BROMLEY, KENT,

to receive the Report of the Directors; the Balance-Sheet certified by the Auditors; to declare a Dividend; and to Transact generally the Business of a General Meeting.

The TRANSFER BOOKS WILL BE CLOSED from the 20th of July to the 4th of August, 1910, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices: 156, High Street,
Bromley, Kent, July 20, 1910.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 18, FINSBURY CIRCUS, E.C.

Just Published. Price 1s. net.

THE SALE OF GAS APPARATUS

BY

J. PATER WIATT.

Author of "Chemistry in Physics," "Internal Combustion Engines," &c., &c.

London: WALTER KING, 11, Bolt Court, Fleet St., E.C.

JOHN HALL & CO. OF STOURBRIDGE,
LIMITED,
STOURBRIDGE,
Manufacturers of
FIRE-BRICKS, LUMPS, TILES,
GAS RETORTS,
And every description of Fire-Clay Goods.

RETORTS CAREFULLY PACKED FOR SHIPMENT.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
NEWTONGRANGE, MIDLOTHIAN.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE, LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

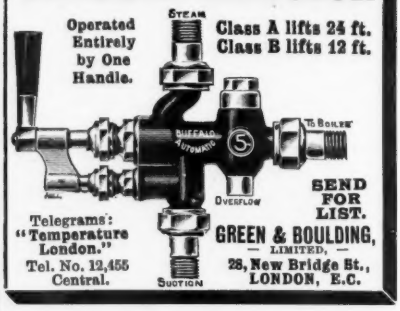
Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & Co., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

HEATHCOTE GAS COAL
from the
GRASSMOOR COLLIERIES,
CHESTERFIELD.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

'BUFFALO' INJECTOR



Operated Entirely by One Handle.
Class A lifts 24 ft.
Class B lifts 12 ft.
SEND FOR LIST.
Telegrams: "Temperature London." Tel. No. 12,455 Central.
GREEN & BOULDING, — LIMITED, —
28, New Bridge St., LONDON, E.C.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1606.

MIRFIELD GAS COAL.
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.

Please apply for Price, Analyses, and Report, to the
MIRFIELD COLLIERY COMPANY,
RAVENSTHORPE, NEAR DEWSBURY.
LONDON: 16, Park Village East, N.W.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C

GRAETZIN LIGHT

Important Improvements.

BURNERS.

1. **20-Candle Power more light** without increase in the consumption of gas.
2. **Patent Gas Adjuster;** cannot get out of order.
3. **Automatic Gas Regulator,** ensures a constant and unvarying pressure of 35 mm., guarantees a steady light, at the same time obviating waste of gas and blackening of the burner.
4. **Accurate Regulation of the Air Supply.**
5. Burners will be supplied either with Gas Adjuster or Automatic Gas Regulator.
6. The brass casing is heatproof, and, if occasionally cleaned with warm water, will not become discoloured.

LAMPS.

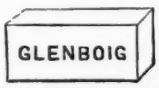
From Lamps with more than one burner, the injectors can be removed from the outside, without taking the lamps to pieces.

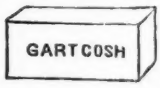
THE GLENBOIG UNION FIRE-CLAY CO., LTD.

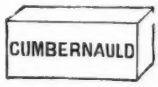
GLENBOIG FIRE-BRICKS AND GAS-RETORTS.

Every Genuine Glenboig Brick, Block, Gas-Retort, &c., is legibly stamped with one or other of the Glenboig Company's Registered Trade Marks, as here shown.

TRADE MARKS.







The Glenboig Trade Marks are imitated, and the Glenboig Name unfairly used by Makers of a lower Class of Goods, which, when sold under their own name, command much lower prices.
The Genuine Brand, Stamped on the Goods, is the only Reliable Guarantee to the Purchaser.

GAS-RETORTS, FIRE-BRICKS, BLOCKS, &c., &c.

The SPECIAL BRICKS used in the Construction of Gas Furnaces for Heating Retorts.

Works: GLENBOIG, LANARKSHIRE.
Offices: 48, West Regent St., Glasgow.

56 Prize Medals and Diplomas of Honour.
Highest Award wherever exhibited.

The GLENBOIG BRICKS, BLOCKS, AND RETORTS combine, in the highest degree, the qualities of not melting, and not splitting, when subjected to the highest heats and most sudden changes of temperature, and are, in consequence, found to be economical, even in districts where the local bricks can be had at half the price.

Undernoted we give a Table of Analysis and Physical Characteristics of a sample of Glenboig Fire-Clay by J. T. Norman, London; and, in submitting a report from a responsible and reliable public analyst, we would here draw attention to the unreliable character of some recently published analyses where a manufacturer selects not only his own samples, but also those of his competitor, and has them treated by a private analyst. SUCH STATEMENTS ARE ALTOGETHER UNTRUSTWORTHY.

ANALYSIS OF GLENBOIG FIRE-CLAY.

By JOHN T. NORMAN, Esq., F.C.S., &c., The City Central Laboratory, LONDON.

THE GLENBOIG UNION FIRE-CLAY CO., LTD., GLENBOIG, SCOTLAND.

23, LEADENHALL STREET,
LONDON, E.C., September 21st, 1909.

DEAR SIRS,

I have completed the investigation of the samples of Clay received from you on the 10th inst., and now beg to report the results.

CHEMICAL ANALYSIS.

	Raw.	Fired.
Silica, free	3·03	3·49
Silica, combined	43·20	49·77
Alumina	36·55	42·10
Ferric oxide	1·80	2·08
Titanic oxide	1·30	1·50
Lime	trace	trace
Magnesia	trace	trace
Alkaline oxides	trace	trace
Sulphates as trioxides	0·92	1·06
Loss on Ignition	13·20	—
	100·00	100·00

PHYSICAL RESULTS.

Density	2·65
Volume weight	1·90
Porosity	15·4 %
Linear shrinkage at 100° C.	3·70%
" " " 1050° C.	4·76%
" " Total	8·46%
Volume shrinkage at 100° C.	10·7 %
" " " 1050° C.	12·6 %
" " Total	23·3 %
Plasticity	20·0 %
Fire Stability	1850° C. equiv. 3362° F. (SEGER CONE 36.) (New Scale CONE 38.

(Signed) J. T. NORMAN.

This Clay is remarkable for its high percentage of Alumina and for the almost complete absence of ingredients tending to lower the refractory properties; its fire stability is extremely high. For some years past I have been urging clients who are working the Clays of the Coal Measures to search for such a material, but you are the first to discover a supply. The possession of this Clay places you in a unique position amongst the manufacturers of refractory goods throughout the world, and I have no doubt will, if duly exploited, enable you to drive out of the market the large quantities of foreign fire-bricks which are being poured into this country for use in the construction of bye-product ovens and for other purposes.—I am, yours faithfully,

JOHN T. NORMAN.

ADDITIONAL REVENUE FOR GAS-WORKS.

COKE SELLING . . AT 11/6 A TON
COALEXLD SELLING AT 20/- A TON
IN THE SAME TOWN.

X

COALEXLD, LIMITED.
LANCASTER.

GAS COAL AND CANNEL.

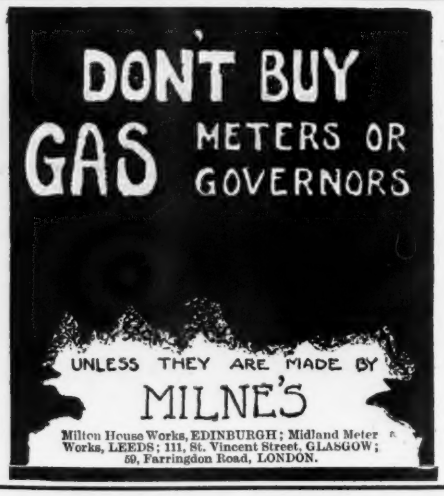
WILSON CARTER & PEARSON,
LIMITED,
Gas, Steam, and other Fuel for Home and Export.
GAS COKE CONTRACTORS.

Chief Offices: 50, NEW STREET, BIRMINGHAM.

Telegraphic Address: "CARTER PEARSON, BIRMINGHAM." Telephone Nos.: CENTRAL 3013 and 3014.

S. S. STOTT & CO.,
ENGINEERS,
HASLINGDEN, nr. MANCHESTER.

LIME & OXIDE ELEVATORS & CONVEYORS.
COAL AND COKE STORAGE PLANTS.
Coal and Coke Elevators and Conveyors.
STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.
DETACHABLE CHAINS AND SPROCKET WHEELS.
HIGH-CLASS STEAM ENGINES. BEAM PUMPING-ENGINES, &c.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GAS METERS OR GOVERNORS
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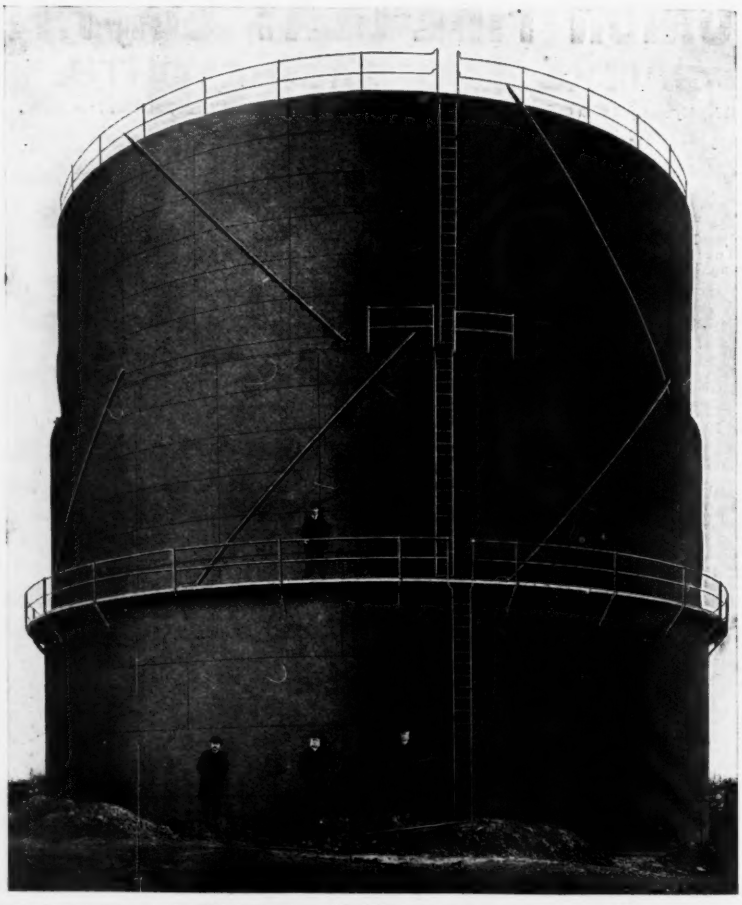

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Welsbach LIGHT

Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

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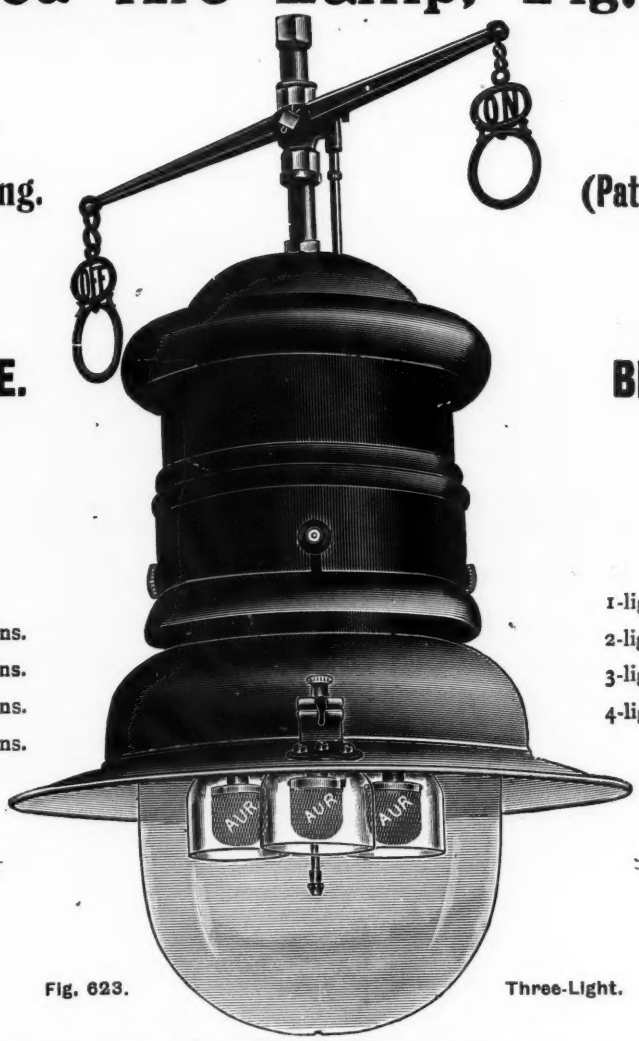

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*		*Gas per hour.*	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.	3-light	12 feet	400	**52/6**	**6/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.	4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
„ „ „ In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra „	**3/6**	**6/-**	**7/6**	Not made

Welsbach Mantles, each **6d.** subject as usual.

The Welsbach Mantles for Upright lighting are "C," "CX," and "Plaissetty," price **4½d.** each.

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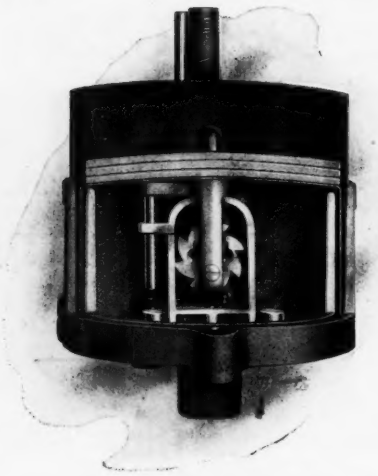

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Saves Labour, Gas, Mantles, and Glasses.

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Requires no Winding.

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Nothing but Metal in it. No Leather, no Rubber, no Glass.

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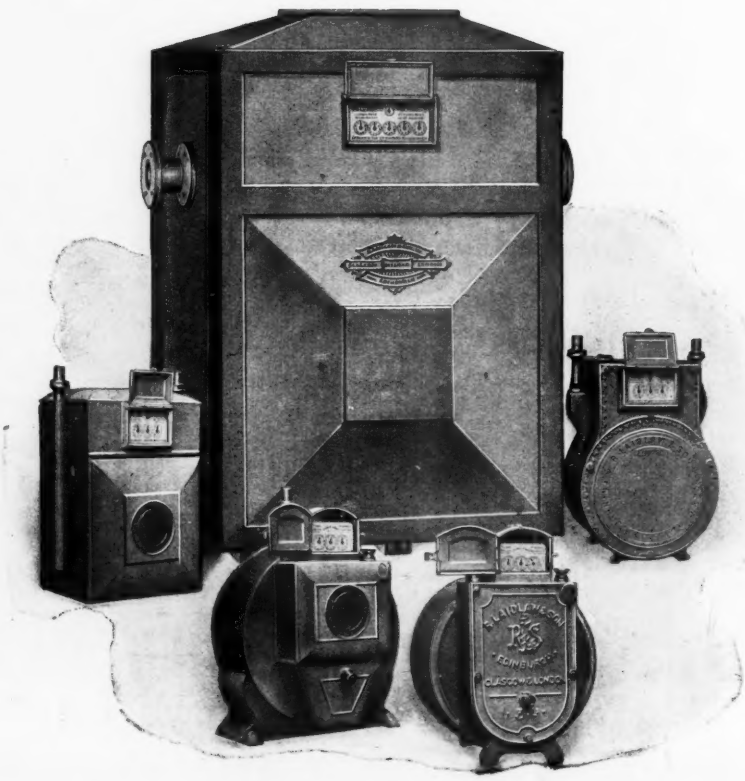

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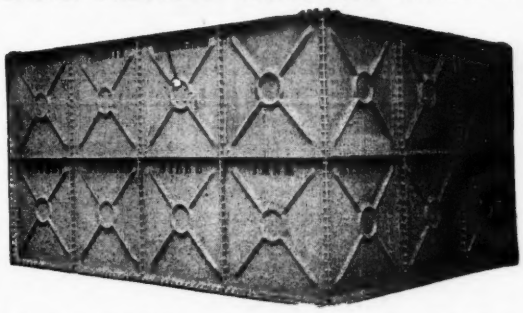

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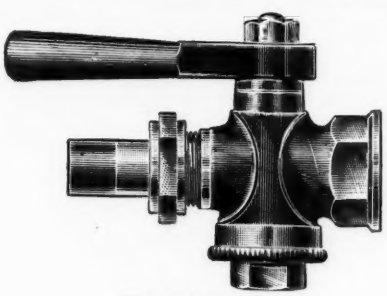

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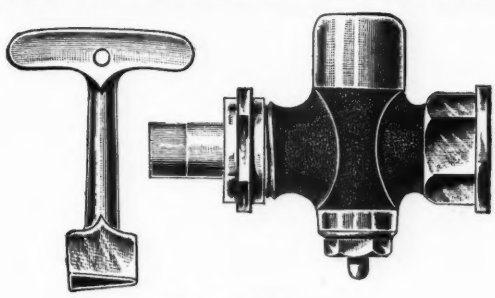

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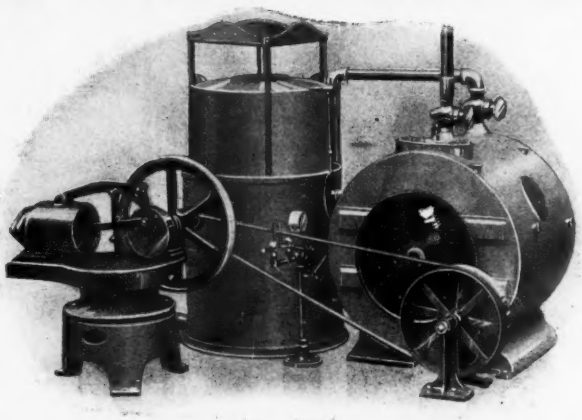

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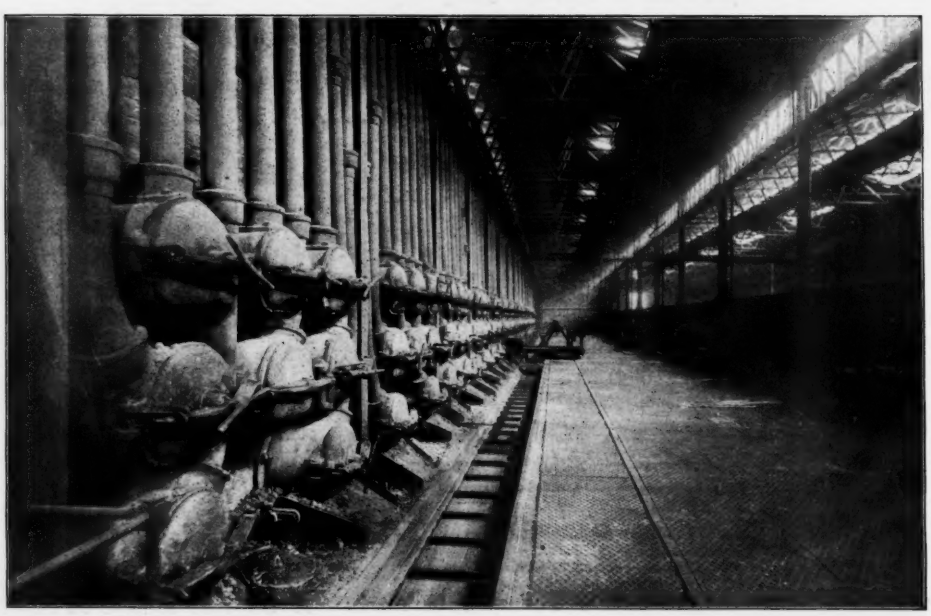

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